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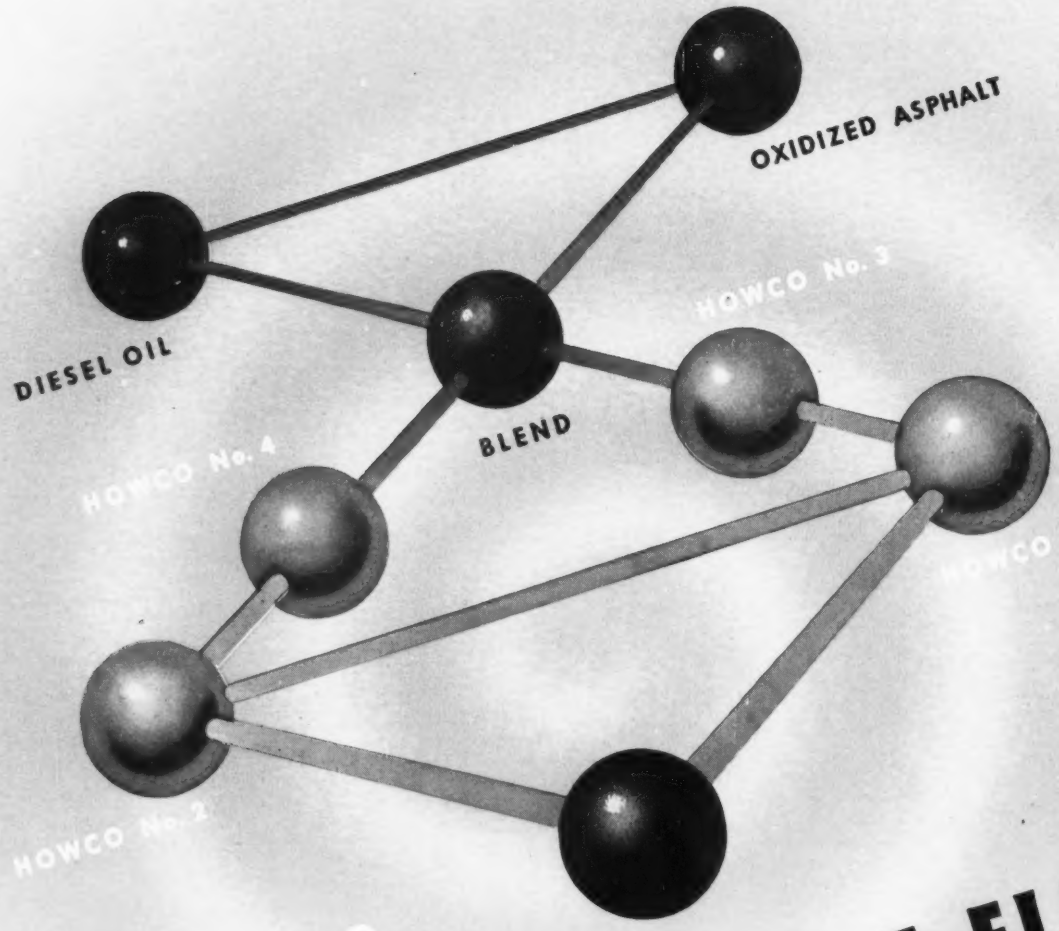

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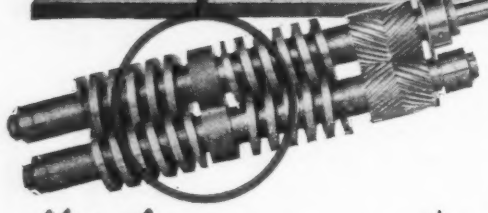

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The Farm Market

A YEAR of postwar operation has emphasized as never before the interdependence of petroleum and agricultural activities. Those in charge of wholesale and retail oil operations in recent months have found that their sales to farmers and within the smaller towns and cities in the agricultural areas are running far ahead of expectations, and 25 to 50 per cent greater than during the same period in 1941.

Some companies have made studies to determine the reasons for existing record demands from farmers, and at the same time to secure basic information on which to project future sales. They have found that modern farm life is as closely allied to petroleum as is any other phase of our economy. The fact that farmers as a group were able to expand important divisions of their output nearly 50 per cent during World War II, despite substantial decreases in manpower, evolved from the utilization of petroleum-powered equipment.

This emergency situation as regards petroleum demands has not changed with the return to peace. The uses of oil as fuel for power are constantly expanding. One investigation reveals that gasoline consumption of the farmer's family car or cars has also greatly increased over the past year.

This survey reveals that in the better agricultural areas of the Middle West it is not uncommon for the petroleum purchases of a single farm of average size to total 5 or more thousand gallons yearly. These requirements include gasoline, lubricating oil, and fuels for cars and tractors and stationary power used in lighting, water systems and other farm operations; furnace oil for heating, liquefied gas for cooking; insecticides, and other special products. These maximum uses indicate the potentialities of a market consisting of 6 million farms in this country.

The oil business has been dilatory in establishing sound public relations with its farmer customers. The farmer's perspective of the oil business largely centers in filling stations, delivery trucks, and finished products. In many sections there has been an important infiltration of the economic and social philosophies of the co-ops in retail petroleum distribution.

What is needed now is an active program on the part of oil companies which will familiarize the agricultural population of this country with the exploration, producing, transportation, and refining phases of this industry's operations from which stem the numerous farm services.

The farmer and oil operator have a common heritage which goes deeper than the exchange of products. They have a background of free enterprise and achievement through individual and collective endeavor. There should be a mutual understanding of each other's problems to the end that they can work together toward common goals at Washington and elsewhere.

House Rejects Amended OPA Bill; Oil Outlook Is Confused

WASHINGTON.—The price-control legislative situation was more muddled than ever Tuesday after the House voted down the Senate approved measure which exempted petroleum and a number of other commodities from control.

By its action, the House sent the bill to a new conference committee where an effort will be made to write a compromise control law that President Truman will sign. Representative Wolcott, Michigan Republican, said "it seems no price control at all can be written unless the Senate is willing to yield from its position."

Mr. Truman commented earlier that the bill as adopted by the Senate is "in terrible shape" and "couldn't be worse."

As it passed the Senate, the measure provided that no price controls should be imposed on crude oil or petroleum products, and it likewise exempted a whole string of other commodities. Otherwise the bill was the same as that vetoed by the President June 29 except for slight modifications in the Taft and Wherry amendments relating to producers' and distributors' profit formulas in fixing price ceilings. All this had been substituted for the original House resolution to extend the old law for 20 days.

In its Senate form the bill would be hard for President Truman to approve because from his standpoint it was worse than the one he vetoed. However, if the conference committee were to knock out all the specific commodity exemptions, the changes in the Taft and Wherry amendments might be sufficient to save face, and he could sign the measure and claim a victory.

In the first OPA bill, the Senate version contained about the same list of exempted commodities, but these were all eliminated in the conference with the House. The administration leaders obviously hoped this would happen again. This time the House conferees would have nothing to trade but, unless instructed otherwise, would be expected to adhere to the earlier House position that specific commodities should not be exempted but that general rules should be written looking to rapid decontrol of many commodities.

Thus, as the House took up the measure, the oil industry was faced with three possible results—a vetoed bill which would mean no price control law at all; a price control law specifically exempting petroleum; and a law written in general terms with decontrol provisions designed to require early decontrol of oil but permitting delay if OPA should choose to take advantage of all technicalities to avoid action.

Further information on the current price-control legislative situation will be found under Watching Washington, page 70.

The oil decontrol amendment to the OPA bill was adopted by the Senate by a vote of 40 to 30 with very little debate after it had become apparent that the Senate was determined to reinstate all the specific exemptions of its original measure.

Moore Offers Amendment

Sen. Ed Moore of Oklahoma offered it with the explanation that it should not be necessary in view of the general decontrol provisions already in the bill. But, he pointed out, OPA and other administration officials have been saying for months that their policy has been to decontrol commodities not in short supply, yet they have failed to do anything about oil in spite of repeated requests from the industry advisory committees.

"The record of OPA in its dealings with the petroleum industry is such that every man in the industry knows that unless Congress excludes petroleum from the joint resolution price controls will nevertheless be maintained on this industry," Moore told the Senate.

"There is also convincing evidence that unless petroleum is excluded from the joint resolution it is the intent and purpose of the administrator to continue these controls on the oil industry notwithstanding what the supply and demand situation may be, and regardless of the unanimous recommendation of the industry and OPA's industry advisory committee."

As proof of this Moore read the Senate the June 27 letter of Administrator Paul Porter to Senator Guffey of Pennsylvania commenting on a letter to Porter from Walter S. Hallanan of Plymouth Oil Co. (This correspondence was published in The Oil and Gas Journal, page 67, issue of July 13). In this letter Porter cited the fact that gasoline demand is higher than earlier estimates of the industry and gave this as a reason why petroleum prices could not be decontrolled.

"I think it is clear from Mr. Porter's letter that he has no thought of releasing controls on the oil industry," Moore said.

Senator Guffey opposed the amendment, but his chief argument was that after World War 1 crude prices skyrocketed for a few months.

Senator Barkley of Kentucky, the majority floor leader, made a pro forma attack on the Moore amendment, saying it is unnecessary because the decontrol board undoubtedly would order oil prices freed from control anyway, to which Moore countered that Administrator Porter "simply will not decontrol oil, although under the law under which he was operating as of June 27 he had no option in the matter, for the law required that he must decontrol oil. But he did not do it."

Senator Taft of Ohio supported this view, saying: "No case was made so clearly before an OPA advisory board as the case for petroleum . . . There is no argument which can consistently be made against decontrolling petroleum . . . I am personally convinced that he (Porter) will not decontrol it, so far as he himself is concerned."

Natural gas is also decontrolled along with liquid petroleum, in the opinion of the author of the amendment.

"It is my opinion," Moore told the Senate, "and I think the courts have passed upon the question, that the term 'petroleum' includes all hydrocarbons, either in liquid or gaseous form, and for the record I want to make it clear that it is the intent and purpose of this amendment to include all forms of gas as well as oil and oil products."

Kansas, Texas Producing Properties Change Hands

Transactions involving the sale of producing properties in Texas and Kansas were disclosed last week.

Pan American Production Co. said it has completed negotiations with General American Oil Co. of Texas for General American's interest in 16 wells in Hawkins townsite in Hawkins field, Wood County, Texas.

General American's interest is equivalent to 14 full seven-eighths working-interest wells. Completion of the deal is contingent on approval of title.

In Independence, Kans., Kansas Gas Co., Inc., announced the purchase of 75 producing gas wells, extensive leased acreage, 17 miles of pipe line and a compressor station 6 miles south of Independence, from Trinity Oil & Gas Co.

NPC Still Concerned About Conflict With Antitrust Laws

WASHINGTON.—The next meeting of the National Petroleum Council will be held the latter part of September, it was agreed last week by Interior Department officials and the council's temporary organization committee.

After several hours in private session the group, headed by Chairman Walter S. Hallanan of Plymouth Oil Co., called on Secretary Krug and Acting Director Davies of the Oil and Gas Division, and informed them that the committee had agreed that the council could perform a useful service in an advisory capacity.

It was no secret, however, that the committee was worried over conflicts with the antitrust laws. An attempt will be made to work out some sort of clearance procedure whereby the Department of Justice will give specific approval of activities which the Interior Department requests the council to undertake. Such certifications were used frequently during the war, but Justice officials are reluctant to make this a regular peacetime practice.

The antitrust problem will be further explored by a legal subcommittee, one of three appointed by Hallanan, which will report back to the organization committee later in the summer. The membership of these committees is as follows:

Recommended scope and procedure.—B. Brewster Jennings, president, Socony-Vacuum Oil Co., Inc., committee chairman; Paul G. Blazer, chairman of the board, Ashland Oil & Refining Co.; W. Alton Jones, president, Cities Service Co.; J. Howard Pew, president, Sun Oil Co.; and Joseph E. Pogue, Chase National Bank.

Organization and personnel.—B. L. Majewski, vice president, Deep Rock Oil Corp., committee chairman; J. Frank Drake, president, Gulf Oil Corp.; A. C. Mattei, president, Honolulu Oil Corp.; Frank M. Porter, president, Mid-Continent Oil and Gas Association; and Charles F. Roeser, president, Roeser & Pendleton, Inc.

Legal.—George A. Hill, Jr., president, Houston Oil Co., committee chairman; B. A. Hardey, president, Independent Petroleum Association of America; Eugene Holman, president, Standard Oil Co. (N. J.); A. Jacobsen, president, Amerada Petroleum Corp.; and Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.).

Kansas Sets Aside Well-Spacing Order

WICHITA, Kans.—The Kansas Corporation Commission last week set aside its controversial new well-spacing order which had been announced but never made effective.

The order, issued April 26, would have set 40 acres for allowable purposes for wells 4,000 ft. or deeper and 20 acres for wells less than 4,000 ft. In addition, the order provided 40-acre credit in 23 specified pools where average depths were less than 4,000 ft. but which were discovered and partially developed during the war when Petroleum Administration for War permitted only one well to 40 acres.

Effect of the commission's action was to continue in force the wartime rule of April 1, 1942. Jeff Robertson, commission chairman, said the commission felt that under the original order in effect more than 4 years "nobody had been hurt."

T. A. Morgan, director of the conservation division of the commission, said the natural result of the decision would be to discourage close spacing. Commissioners said the proposed new order would have resulted in endless protests and hearings.

It was announced there would be no change in the minimum-well allowable of 20, 25, or 30 bbl. per well, according to acreage or well pattern. The commission said the minimum well allowable matter would be heard July 25. The commission had continually insisted technically that it has no legal authority to determine well spacing but only can determine the area for which credit will be given in production.

The April 26 order resulted in protests from several independent operators, and the commission granted a rehearing which was held May 27. The new spacing order was to have gone into effect July 1, but pending a decision on the rehearing, it was held up.

In issuing the order of April 26, the commission detailed its position in an accompanying 10-page memorandum. It expressed the desire to protect operators who invested "good money" into wells drilled under wartime 40-acre spacing and at the same time to protect operators in other areas who drilled closer under the rules of their day. The commission indicated a willingness at the time to consider assignment of larger acreages under the rule.

New Interest Reported in Rocky Mountain Group

CASPER, Wyo.—At the recent board meeting of the Rocky Mountain Oil & Gas Association in Yellowstone Park, Wyo., new interest was shown in the association's activities by both large and small operators in the Mid-Continent area as well as the Pacific Coast region.

Discussion centered on a projected history of the Rocky Mountain oil areas, the appointment of a regional production committee, and the proposed oil and gas conservation law for Wyoming.

Paul Stock, association president, outlined a program by which a factual history of the oil industry in the Rocky Mountain region will be written. This project is to be handled by a college or university student who will receive a consideration for his work, his tuition in whatever school he is now enrolled, along with traveling expenses in acquiring the necessary data. The student will be expected to contact operators for personal interviews and do research work in various libraries.

W. L. Connelly, vice president, Sinclair-Wyoming Oil Co., told the board the American Petroleum Institute had requested him to inquire into the advisability of the association's appointing a petroleum production committee, consisting of 10 members to serve as the A.P.I. Rocky Mountain Region official production committee. These members would be passed on by the A.P.I. at its annual meeting in Chicago in November.

J. M. McIntire, chairman of the natural-gas committee, brought the board up to date on public hearings held by the Federal Power Commission. He recommended that the association go on record as opposing any further encroachment upon states' rights by FPC, relative to production and transportation of natural gas and crude petroleum.

H. H. Healy, chairman of the legal and legislative committee, gave a report on the proposed oil and gas conservation law for Wyoming. Operators were about equally divided in opposition and approval of any conservation law.

There was little discussion on the proposed law. The board suggested that all operators who had recommendations to make, submit them to the association's office by August 1.

A.P.I. Studies Marketing Problems

DENVER.—The summer meeting of the marketing division of the American Petroleum Institute was held at the Brown Palace here July 9-11 with approximately 50 members attending.

Tuesday morning the program committee discussed topics to be presented at the annual meeting in Chicago next November, followed by a report to the division in the afternoon by Walter Hochuli, chairman. L. C. Welch, in charge of the lubricants division of Standard Oil Co. (Ind.), also reported at this session on the work of a subcommittee on lubricants specifications, and J. G. Dyer, vice president Sinclair Refining Co., chairman of a special committee on public relations, reviewed the committee's findings on how relations between the service stations personnel and the customers could be improved.

Howard W. Page, head of the coordination and economics department of Standard Oil Co. (N. J.) spoke on the future of the industry at the afternoon session on Wednesday. He estimated civilian aviation gasoline consumption in 1950 will be almost three times that in 1946 and predicted diesel fuel consumption will increase by 110 per cent by 1950. He said the peak load for the petroleum industry would come in 1948 when both domestic and export requirements will be high. By 1950, he explained, foreign production and refining will supply much of the foreign demand. Page's paper is published in full on page 68 of this issue.

Robert Gray, editor of Fuel and Oil Heat, spoke of the tremendous growth which may be expected in the popularity of oil heating, due to small town markets and the inclination to substitute for coal. The public, he said, has "gone sour" on coal, and gas is regarded as the principal competitor.

Walter M. Hughes, automotive editor for Hearst publications, discussed a survey of eight cities to determine what products and services the motorist expects from gasoline service stations. The survey indicated a willingness of customers to be satisfied with less free services. For example, he said, there was a willingness among motorists to pay for road maps now given free by major companies.

J. A. Lentz, Denver, western sales manager of Continental Oil Co., was host chairman at the Wednesday meeting. Wednesday night a banquet sponsored by Continental Oil Co. was given at the Brown Palace, and on Thursday the guests took a trip through the Denver mountain parks and stopped at Troutdale for a trout luncheon.

Peerless Gas-Price Suit Is Continued

OKLAHOMA CITY. — Three days of testimony on the issue of prevailing gas prices in the Hugoton field and methods of measuring were taken last week by the Oklahoma Corporation Commission in a case closely watched by the natural-gas industry.

Peerless Oil & Gas Co. is asking the commission to order an increase the wellhead price of gas at Guymon, Okla., and to direct a revision of metering methods used. The suit is against Cities Service Gas Co.

The case was continued until September 9 following the hearing last week. A third phase of Peerless' suit which asked the commission to require Cities Service to connect to two Peerless wells was settled when Cities Service advised the commission it is making the necessary connections. Cities Service stipulated it will pay Peerless 4.5 cents per 1,000 cu. ft and a retroactive increase if ordered by the commission.

Much of the testimony in the hearing centered on the value of natural gas as compared to other fuels and whether the prevailing price constitutes economic and physical waste. Witnesses were those testifying for Peerless. The Oklahoma school land department has intervened in the case because of its large land holdings and royalty interests in the Oklahoma Panhandle.

M. L. Mayfield, Houston engineer, testified as to comparative values of natural gas and coal. Guymon gas, he said, should be valued at 23 cents per 1,000 cu. ft. compared with coal at $5.31 per ton. Mayfield had previously testified on the value of gas in the Kansas City market in an effort to show that 10 cents per 1,000 cu. ft. would be a fair field price.

Walker T. Pound, chief Oklahoma conservation officer, told the commission that physical and economic waste results from the low prevailing gas price in the Texas County, Oklahoma, section of the field. Physical waste is caused by completion methods at "virtually every well" in the field, he said.

Economic waste results in earlier abandonment of wells and the field and thus reduces ultimate recovery. The conservation officer recommended a price of 10 cents per 1,000 cu. ft. at the well and said surveys in other states show that "when gas is sold at 10 cents or more, there is virtually no waste."

In objecting to higher prices, R. E. Cullison, Cities Service counsel, asserted that excessive prices will destroy the industrial sales of all the gas companies. He mentioned the bankruptcy of nine gas companies in Kansas in recent years.

When the hearing is resumed, Cities Service is expected to offer testimony showing that costs and other factors work against higher field prices for gas. Technical evidence is due to be presented in defense of the present measuring method by which gas is purchased at 2 lb. above atmospheric pressure.

Louisiana Legislature Votes Against Gas Policy Change

BATON ROUGE, La.—The Louisiana Legislature beat back another attempt to reverse the state's declared policy against natural gas export before it adjourned last week.

The action came when the house voted down a resolution, 31-51, which would have repealed another legislative resolution of 1942 directing the state Public Service Commission and Conservation Commission to oppose before the Federal Power Commission any application to export gas from Louisiana.

One opponent of the resolution, Rep. Morris Lottinger, Terrebonne, asserted, "I am from a gas-producing parish and am interested in keeping some of it here so we can get industries here—not supply them in the East."

Lottinger, who had unsuccessfully sought passage by the legislature of an excise tax on natural gas, noted that the Louisiana lawmakers already had passed one resolution requesting the governor to seek concerted action among Southwest producing states to raise the field price of gas.

In the further discussion over the resolution to reverse the state's policy, Rep. C. O. Webb, Red River, said such a resolution would make useless the office of natural gas conservation. On the other side in favor of the resolution, Rep. Ragan Ladden, Lincoln, said repeal would not affect the office, that Louisiana had an abundance of gas, and that coal-producing states were attempting to promote limitation of gas export for their benefit.

Water-Flood Hearing Set

AUSTIN. — The Texas Railroad Commission has set a hearing August 1 in Austin on the application of Dean Brothers for permission to water-flood four leases totaling 603 acres in Callahan County.

THIS 1946 WEEK

S	M	T	W	T	F	S

PRICES—Senate votes amendment to price-control revival bill specifying petroleum remains decontrolled unless new board finds supply fails to equal domestic demand. . . . Industry speculates what will happen to bill in House-Senate conference, whether President Truman will again exercise his veto power. . . . ¶Measure provides for continued stripper subsidies "at not greater than existing rates" and terminating the end of next March. . . . ¶Markets hold steady at ceiling levels pending outcome of legislation. . . .

INTERNATIONAL—Creole discloses plans to build $65,000,000 refinery and housing project at Bahia Amuay on Paraguana Peninsula in western Venezuela. . . . Refinery capacity to be 60,000 bbl. daily. . . . ¶Production in Iran halted by new strike believed to be Russian-inspired. . . . British Government reported concerned over situation. . . . Martial law declared in Ahwaz, capital of Khuzistan, Persian troops occupy some Anglo-Iranian properties. . . . ¶U. S. Government officials reported considering agreement with five South American countries to build 1,700-mile pipe line from Peru's Montana to Venezuelan coast as national-defense measure. . . .

NATURAL GAS—FPC hearing in Washington enters fifth week. . . . Commission hears testimony of gas reserves and regulatory practices in California. . . . ¶Louisiana Legislature adjourns after defeating resolution to reverse state's policy against gas export. . . . ¶Peerless Oil & Gas case continued after 3 more days of testimony in Oklahoma City. . . . Company is seeking higher price for Hugoton field gas. . . . ¶FPC approves six gas-company construction and expansion projects—East Ohio Gas, $4,620,000; Southern Natural Gas, $2,608,200; Kentucky Natural Gas, $213,840; Cincinnati Gas Transportation, $1,800,000; United Gas Pipe Line, $2,277,000; Hope Natural Gas, $5,327,500. . . .

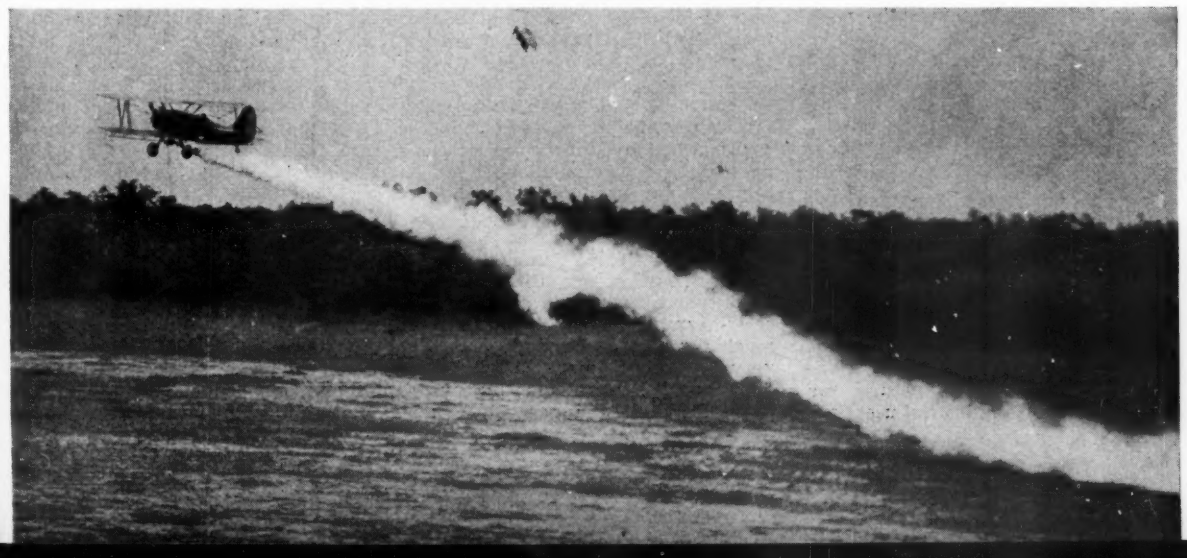
REFINING—President signs bills giving small refiners without crude source preference on government royalty oil when open-market supplies are not available. . . . ¶Mid-West Refineries announces operations to be suspended at Grandville, Mich., plant because of inability to obtain crude supply. . . . ¶Bareco Oil to discontinue crude processing at its Barnsdall, Okla., refinery and turn plant into wax-manufacturing unit. . . . Wartime technical developments making centralization of operations desirable cited.

PRODUCTION—Texas hearing on August allowable scheduled this week. . . . Railroad Commission expected to make some slight cut in current high output. . . . ¶Figures for week ended July 13 show upswing in U. S. production to 4,933,760 bbl. daily, a 14,640-bbl. daily increase. . . . Texas output unchanged, Kansas, Michigan, and Mississippi increase. . . .

REGULATION—Kansas Corporation Commission sets aside controversial April 26 well-spacing order. . . . Action continues in force wartime rule. . . . ¶Executive committee of Interstate Oil Compact votes to recommend extending associate membership to nonproducing states. . . . Final action to be taken at Grand Rapids, Mich., meeting, August 8-10. . . . ¶Compact committee studies problem of standardizing reports required by state regulatory bodies. . . . ¶Three subcommittees of National Petroleum Council named by Hallanan to further organization groundwork. . . . One group will study antitrust aspects of council's functions. . . .

DEMAND—Howard W. Page, New Jersey Standard economist, predicts 23 per cent increase in domestic gasoline requirements by 1950, substantial increases in other products except residual. . . . ¶May imports total 12,450,000 bbl. against 10,165,000 bbl. in April. . . . Increase confined to refined products, mostly residual. . . .

A major outlet for many new petroleum products currently being developed is in the field of agriculture. Here is shown the method of aerial distribution of the oil-base DDT spray of Socony-Vacuum Oil Co., Inc. The spray emerges from the plant's exhaust as a white fog. The oil industry is taking greater cognizance of the present and potential role of petroleum products in farm use. One phase of activity of the American Petroleum Institute's new agricultural committee consists of research on the development and use of such special petroleum products as insecticides, weed-killers



Natural-Gas Reserves in California Aired at FPC Hearing

WASHINGTON. — Natural-gas reserves in California and the gas-regulatory practices of the California Railroad Commission occupied a major portion of last week's hearings in the natural-gas investigation of Federal Power Commission.

The witness was Roy A. Wehe, assistant director of the Public Utilities Department, and FPC was much interested in his description of conservation practices in the state and particularly the commission's treatment of customers purchasing gas on an interruptible contract.

Wehe said it is usually possible for a gas line to get firm all-year contracts for 100 per cent of its capacity and it is therefore necessary to sell some gas on an interruptible basis. This practice has often been criticized on the ground that such customers usually have hard-luck stories and so are not cut off when gas is scarce, with the result that the interruptible contract becomes a device for getting a cheap rate for gas. The California commission, Wehe said, requires that every customer obtaining gas at a low rate on an interruptible contract must have full standby facilities for using other fuels in case of gas shortage so there will be no question that their gas will be shut off when necessary. If there is still insufficient gas he said the commission requires stopping service to customers paying the lowest rates, so that domestic users will be the last ones cut off.

The firm rate for industrial use of gas is fixed by the California commission on the basis of the cost of competing fuels, and the interruptible rate is between this and a floor based on out-of-pocket costs, and Wehe said that in spite of this rate difference many utilities are planning to use oil for steam generation because of the danger of interruption of gas service. He told FPC that there is no reason why natural gas should not be used for steam generation by electric-power utilities if the fuel savings are passed on to customers in lower electric rates provided the gas is not sold to them at sacrifice prices, but he admitted that the sale of gas at a low rate on interruptible contracts may lead to higher rates for all consumers in the future if depletion of reserves causes an increase in cost of gas.

The California official insisted that state authorities rather than the federal Government should regulate the price and utilization of natural gas, including rates to industrial users and whatever control of "end use" is required for conservation. In his state, Wehe said, there is very little waste of natural gas because the price is sufficiently high to promote conservation, and he predicted a further increase in gas prices shortly. He pointed out that most natural gas in the state is produced along with oil and when OPA froze crude-oil prices it also maintained the average field price of gas at 8.2 cents per M.c.f. While this is sufficiently high to promote conservation, Wehe said producers complain that it is too low and as soon as OPA restrictions are lifted the field price probably will go to around 11 cents per M.c.f.

An elaborate exhibit estimating the natural-gas reserves of California was presented by Wehe, who said that reserves now total about 11 trillion cubic feet and current production is about 500 billion cubic feet per year. He also discussed at considerable length the various methods used in estimating natural-gas reserves.

The remainder of the week was devoted to witnesses representing various coal interests, all of whom complained about competition from natural gas and who felt that gas should be "conserved" until such time as it is needed for special uses for which no other fuel is suitable.

However, observers felt that these witnesses did not make much of an impression on the commission because their cases usually thinned out on cross-examination. For example, none of them had any answer when asked if the present owner of natural gas reserves should be prevented from using his own gas as he pleases, or if private owners should be required to hold gas in the ground until "higher uses" develop or whether the Government should buy them out. They also were vague about what sort of regulations the FPC should impose to protect coal markets. They usually were forced to admit that a user has a right to burn whatever type of fuel he desires, and also to admit that if coal markets are to be protected completely the Government will have to regulate the use of oil and other fuels.

A number of the witnesses stressed the research projects in better utilization of coal which are now being conducted by various companies. On cross-examination they admitted that much remains to be done and that very little coal research was conducted until it was forced by competition from oil and gas. Their plea was that the Government should hold back the use of other fuels until coal can catch up on its research, otherwise the coal industry will not have the funds to do any research. In time, they thought, the coal industry will develop improved stokers and gassification and pulverization processes which will make coal more economical than oil or gas.

May Underproduction in Texas at 7.42 Per Cent

AUSTIN.—Texas' oil fields fell 5,239,729 bbl. short of producing the full allowable authorized by the Railroad Commission during May.

The commission reported underproduction ranged up to 18.85 per cent in North Texas. The average was 7.42 per cent. Actual production during the month was 65,368,514 bbl. The commission estimated July underproduction at 5.44 per cent in setting July allowable.

Hawkins Allowable Stands Pending Appeal Outcome

AUSTIN.—The Texas Railroad Commission last week decided to continue with its allowable formula for Hawkins field, Wood County, pending a decision on the case by the Texas Supreme Court.

The commission's policy of permitting a well on a 40-acre plot to have four times the allowable of a town-lot well was attacked by Humble Oil & Refining Co. which asserted the method deprived it of an opportunity to recove an equitable share of the field's reserves. Humble owns more than two-thirds of Hawkins field's production. The case has attracted considerable interest among Texas operators.

Osage Council Votes to Abandon Public Auctions

Future sales of oil leases by the Osage Indian Council will be held under the sealed bid system, George V. Labadie, spokesman for the council said last week.

At the council's recent meeting, members said that declining income led to the adoption of the new plan, and they believed larger acreages will be leased under the bid system instead of by public auction. Headrights for the Osages have decreased from $300 to $260 per quarter, a fraction of the income received in past years by members of the tribe.

Further economy measures adopted will abolish the services of a tribal attorney and the office of council secretary. Four sales of leases will be held each year, the same as previously, but council meetings will be semimonthly in place of once a month.

Market Shows Little Change as Demand Continues Heavy

by Dahl M. Duff

THE petroleum market picture showed little change this week with prices at or near ceiling levels and demand continuing extremely heavy.

Since the price-control legislation is still pending in Washington and the general situation uncertain, virtually all suppliers appeared inclined to hold the line at the now-defunct ceilings which were reached shortly before the Office of Price Administration expired.

The heavy gasoline demand in the Mid-Continent area last week was centered in Kansas. There was some talk among refiners of prorating their customers, but the situation there was expected to improve as soon as the harvesting season begins tapering off. To facilitate the task of harvesting Kansas's anticipated 200,000,000-bu. wheat crop, the State Corporation Commission recently extended wartime emergency authority to contract carriers of petroleum products.

Kerosene and light burning oils were tight. Refiners and other suppliers are seeking to enter the forthcoming season of heavy demand for these products with stocks as large as possible, but active buying was preventing substantial build-up in some cases. One buyer reported many offerings of No. 2 recently available in the market have disappeared.

From New York came a report that residual No. 2, and kerosene remain "fairly tight," though some supplies are available. No sales above the former OPA-ceilings were reported in this area.

In California, oil marketers along with many other lines of business also were marking time awaiting the outcome of the Congressional fight over OPA. Whether the entire price structure on the Pacific Coast will be revamped or marketers will be satisfied to remove individual price inequities remains to be seen, it was said.

Gulf Coast marketers reported little open-market trading, and offerings were on "market price date of lifting" basis. A number of inquiries for gasoline and kerosene were reported, but the uncertain situation resulted in a scarcity of offerings.

A slight drop in daily gasoline demand in the week ended July 6 was reported. Demand was off 21,000 bbl. to a total of 2,131,000 bbl. daily. The total was only 44,000 bbl. daily under the wartime demand of the corresponding week of 1945.

According to American Petroleum Institute figures, stocks of light fuel oil again increased over 1,000,000 bbl. during the week ended July 6 to bring their total gain in the past 5 weeks to more than 6,000,000 bbl. Gasoline stocks during the week declined 621,000 bbl. to a total of 91,712,000 bbl.

Cooperative Group Planning Water-Flooding Program

COFFEYVILLE, Kans.—The Cooperative Refinery Association is preparing to undertake an experimental water-flooding program on a 300-acre lease near Independence, Kans., within the next few months.

In disclosing the plans, P. T. Jaudet, chief petroleum engineer for the association, pointed out the property was purchased for the purpose of carrying on water-flooding experiments. Located about 6 miles southwest of Independence, the tract has six wells with small production and about 140 undeveloped acres. The association owns a total of 430 wells in Illinois, Kansas, Oklahoma and Texas, on lands covering nearly 100 square miles.

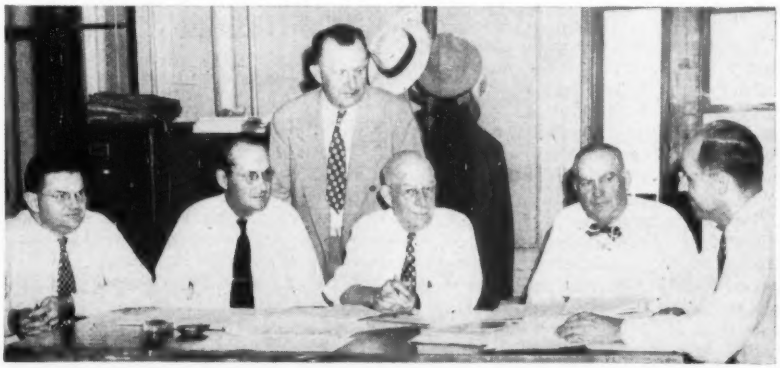
General Land Office Merged With New Bureau

WASHINGTON. — The century-old General Land Office passed out of existence this week and became part of the new Bureau of Land Management when the Senate narrowly voted down a House resolution which would have killed a presidential reorganization order making the change.

The shift was fought out by a number of western senators, particularly Cordon of Oregon, partly because they did not like the sound of the title. That word "management," Cordon said, implies proprietary handling of public lands on the part of the Government, whereas for 120 years the General Land Office has been in the business of transferring land to private ownership.

Selling and management are as far apart as any two administrative duties could be, Cordon said, predicting that the new bureau will get confused in its duties of conservation, grazing, mineral leasing, and land disposal and will forget that the public lands belong to the people. Cordon said he was fearful this proposal is an invitation to attend the obsequies of the land laws of this country under which the whole west grew.

All top positions in the land office and the Grazing Service are abolished, and new ones created which may or may not be filled with the same persons. The new bureau takes over all former GLO functions, including administration of the oil and gas leasing laws.



An Interstate Oil Compact Commission subcommittee met last week in Oklahoma City to study the problem of standardizing the forms and reports required by the various state oil regulatory bodies. Shown here are: Seated—Lawrence Alley, chief clerk, Oklahoma Oil and Gas Conservation Department; Glenn Staley, New Mexico proration umpire; T. A. Morgan, committee chairman and director of the Kansas Oil and Gas Conservation Department; Guy Tate, Magnolia Pipe Line Co., Dallas, industry representative; E. G. Dahlgren, assistant compact secretary; and standing—Earl Foster, compact secretary. The subcommittee's recommendations will be presented to the regulatory practices committee at the compact's quarterly meeting August 8-10 in Grand Rapids, Mich. "Simplification of forms and reports is vitally tied in with conservation," Morgan said. "It means a lot to the oil companies, and if we can eliminate some forms and reports and make others uniform, we will be making a definite contribution toward conservation"

International

WORLD-WIDE OIL DEVELOPMENTS

Creole to Build $65,000,000 Venezuelan Refinery

CARACAS. — Creole Petroleum Corp., a subsidiary of Standard Oil Co. (N. J.) will build a $65,000,000 refinery with a capacity of 60,000 bbl. daily at Amuay Bay on the Paraguana Peninsula in western Venezuela. W. J. Connolly, manager of the manufacturing division of Creole, said that the plant will make all refined products. Extensive housing facilities will be built, and 4,000 men will be employed during construction.

Negotiations are still under way for a 26-in. pipe line to transport crude oil from the Lake Maracaibo area to Paraguana. This line has been planned to follow a route along the Bolivar Coast. A submarine crossing has been considered across the shallow water of Golfete de Coro. It is reported that other operators in the Lake Maracaibo basin may become partners of Creole in the construction of the line.

The site of the proposed Creole refinery is near that of the 40,000-bbl. refinery now being built by Shell Co. of Venezuela, Ltd., at Las Piedras on Amuay Bay at the southwest corner of the Paraguana Peninsula where there is deep water and a fairly sheltered position for navigation. This location is approximately 80 km. (50 miles) from Aruba where Lago Oil & Transport Co. (subsidiary of Standard of New Jersey) operates the largest refinery in the Western Hemisphere. It is understood that the proposed refinery of Creole at Amuay Bay will not reduce operations of the Aruba plant because the increasing production in Venezuela will require larger facilities.

Creole, the largest crude oil producer, with more than 7 per cent of the world's production, produced a total of 554,513 bbl. daily of Venezuelan oil in May, of which 400,629 bbl. came from fields in Lake Maracaibo approximately 200 km. (124 miles) from the Amuay Bay refinery site. For a number of years Creole has been operating a refinery at La Salina on Lake Maracaibo with a daily throughput in May of 9,800 bbl. Creole's refinery at Caripito in Eastern Venezuela had a May daily throughput of 42,000 bbl.

The programs for building the Creole and Shell refineries were the outcome of agreements reached with the Venezuelan Government for the purpose of increasing refinery facilities with the company and in accordance with present Venezuelan petroleum laws. During the Medina regime plans had been made by Creole to locate the proposed refinery on Turiamo Bay near Puerto Cabello. The location was changed at the request of the new Venezuelan Government which objected to the Turiamo Bay location.

Anglo-Iranian Strike Halts Production

NEW YORK.—Production from Anglo-Iranian Oil Co.'s prolific fields in southwest Iran was reported halted early this week as the result of a new strike of oil company laborers which was accompanied by martial law in Khuzistan Province.

Reports from London described the British Government as seriously concerned over the situation and said some sources there believe the latest outbreak, like an earlier strike late in May, was fomented by Russians. The Tabriz radio has for the last several months been carrying on highly inflammatory anti-British propaganda.

Iranian Army troops occupied some properties of Anglo-Iranian Oil Monday, and martial law was declared in Ahwaz, capital of Khuzistan. These moves followed the walkout Sunday of more than 100,000 laborers.

The workers allegedly struck in protest against the return of Governor General Mesbah Fatemi to Khuzistan and the "interference of the Anglo-Iranian Oil Co. in Iran's political affairs." Troops occupied the company's pumping stations at Ahwaz and Kutabdullah and took over labor clubs. Labor union heads in Tehran were said to have asked the Iranian war minister to instruct the military commander in Khuzistan to refrain from interfering in the strike.

Current production in Iran, all by Anglo-Iranian Oil, has been approximating 400,000 bbl. daily. Most of the crude is refined at the company's huge Abadan refinery, the world's largest. The early strike in May—supported by leftists—ended when workers agreed to submit their demands, including doubling present wages, to an Iranian Government arbitration commission. Production was reported halted for 2 weeks.

U. S. Officials Reported Studying Peruvian Line

NEW YORK.—Anticipating the day when the military forces in the Western Hemisphere might need additional vast crude supplies on the eastern side of the Panama Canal, the U. S. Government's high policy makers reportedly are considering a plan, in conjunction with the governments of five South American nations, to build a 1,700-mile pipe line from somewhere in the yet-undeveloped Montana region in Peru to some undisclosed deep water port off the Venezuelan coast.

The five countries which might participate in such a project would be Peru, Venezuela, Bolivia, Colombia, and Ecuador. Moreover, the U. S. Government planners have told various oil officials here that "if U. S. funds are used to build any oil pipe line in foreign countries, a pipe line in South America will get the priority."

Colon Development's Output

CARACAS. — Colon Development Co., Ltd.'s production for the 5 weeks ended June 3 was 571,466 bbl., compared with 472,854 bbl. for the 4 weeks ending April 29.

U. S. Contests Russian View of German Assets

VIENNA.—Coincident with the refusal by the Austrian Parliament to accept Russia's interpretation of the Potsdam Agreement as to what constitutes bona fide German assets in Austria, General Mark Clark released a statement from President Truman in which the latter said the United States would refuse to recognize any definition of "German assets" in eastern Austria that did not conform with the United Nations' declaration of 1943 and the Moscow declaration of the same year.

Moreover, pending negotiations with other allies and Austria, looking toward a renunciation of the U. S. Government share in German assets, the U. S. Government agreed to turn over to the Austrian Government all German assets in the U. S. zone there —assest that valued upwards of $10,000,000.

The long-disputed "German assets" in eastern Austria largely concern those which Germans obtained under wartime duress, forcing legal owners to relinquish their claims. Russia, while having previously agreed—on two separate occasions—to honor such claims, so far has refused to do so. And meanwhile the Zisterdorf oil fields, and other Allied oil properties which the Germans obtained under duress, are being either exploited or, in the case of machinery, moved to Russia.

Dean Acheson, U. S. acting secretary of state, told reporters in Washington that discussions with Russia, as to what constitutes legal Nazi war booty, had been under way for some time, but that no satisfactory conclusion had been reached. Acheson said that the U. S. State Department has also been conferring with Soviet authorities as to what constitutes German assets in Rumania and Bulgaria, but that the Austrian question was of prime importance in that the "Big Three" at the 1943 Moscow conference guaranteed the freedom and independence of Austria. So far Russia has not respected this agreement.

Another sidelight on Russia's policy to clash with the Allies in Austria and refuse to abide by previous commitments is the current refusal to supply UNRRA requirements with sufficient gasoline. At first, Russia refused to comply with such oil needs at all, but when it became evident that Austria would receive supplies only in a proportionate amount to gasoline made available, Russian authorities relented.

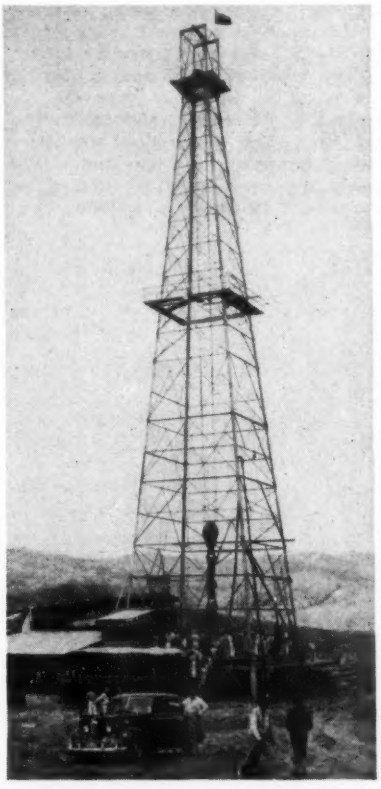
Failure and uncertainties of petroleum deliveries from the Soviet zone in Austria has resulted in a "critical situation," General Clark said in his monthly report to the War Department. Except for gasoline, Austria has been dependent on these products from the Soviet zone since May. "Until June 28, the only Soviet-supplied petroleum products received in the U. S. zone against May and June quantities were 600 tons of diesel oil," the general reported. A summary of his report was released by authorities in Washington.

Iranian Minister Proposes International Oil Company

PRINCETON, N. Y.—An international oil company in Iran, with participants being United States, British, Russian, Dutch, and other foreign interests was proposed here July 11 by Iranian Minister Hussein Ala, who explained that he had recommended this proposal to his Government. Ala was speaking before a Princeton University debating society on "Power Politics in the Near East."

"This company," he said, "could be controlled by the Social and Economic Council of the United Nations. Why should not oil, which is just as explosive as the atomic bomb, be dealt with by a special committee of the United Nations?" Ala asked. He recalled the fact that the Russians wanted to form a company in which they would hold the controlling 51 per cent interest "to explore and exploit the oil in Iran."

The Iranian minister to the United States also took occasion to mention that there has still been no official word as to whether Soviet troops had left the northern province of Azerbaijan and hinted that some Russians probably were still there disguised as civilians.



Tubara Oil Co.'s No. 1 was spudded in early in June on the coast of Colombia, 7½ miles south of the Caribbean port of Puerto Colombia. Latest reports say the deep test is setting 13⅜-in. casing at 1,240 ft. The rig is good for 12,000 ft. Tubara is jointly owned by Socony-Vacuum Oil Co., Inc., and International Petroleum Co., Ltd.

International

WORLD-WIDE OIL DEVELOPMENTS

La Pax Field Development Aids Production Increase

NEW YORK.—Officials of Venezuelan Oil Concessions, Ltd., one of Venezuela's principal crude-oil producing companies, told stockholders at the annual meeting that production for the year 1945 had gained some 35 per cent, to 61,675,125 bbl., and profits had risen nearly 12 per cent, from $2,753,100 in 1944 to $3,073,000 in 1945.

A contributing factor to the increased production was in the develment of rich La Pax field where the oil-bearing horizon is of exceptional thickness and yields crude oil of reasonably good quality. Current production from the field is about 40,000 bbl. daily.

Sir Andrew Agnew, chairman of the meeting, called attention to the steadily increasing cost of Venezuelan oil and the probable effect on its competitive power in world markets. "Cheap Middle Eastern supplies," he said, "already are making inroads in areas which formerly imported all or part of their oil from Venezuela, and it is difficult to see how Venezuelan supplies will be able to hold their own against such imports."

Caribbean Gulf's Second Wildcat at 236 Ft.

NEW YORK.—Caribbean Gulf Oil Co. this week was reported drilling at 236 ft. at its second Colombian wildcat in the Zahino Concession, 27 miles south of Shell Oil Co., Inc.'s Casabe field in the Yondo Concession.

Location of the first wildcat is in Sardinata Concession, adjoining the Yondo Concession. Both tests are work obligations under contract.

Increase of 23 Per Cent Forecast In Foreign Demand by 1950

by Howard W. Page

IN presenting my subject "Worldwide Supply and Demand Forecast Through 1950," I would like to point out the limitations and probable inaccuracies of any forecast of the future. Any forecast, however carefully prepared, involves assumptions, some of which have a sound statistical basis; others, especially where political factors are involved, must be based on judgment. In some cases "judgment" could be better defined as "guesswork." The value of a particular forecast based on specific and consistent assumptions is not so much in the numerical answers obtained, but in providing a framework for easy evaluation of alternative assumptions and new unforeseen factors. No two people will use the same set of assumptions. However, there is one element in a forecast on which all can be in close agreement—the past and present situation. A few facts should be sufficient to describe what is actually happening at present.

Howard W. Page ranks as one of the oil industry's leading economists. He is head of the coordination and economics department, Standard Oil Co. (N. J.). A graduate in chemical engineering from Stanford University, he did postgraduate work at Massachusetts Institute of Technology. He joined Humble Oil & Refining Co. in 1929, and in 1933 shifted to the staff of the New Jersey company, serving for 7 years as assistant manager of European refining activities with offices in Paris and London. During the war he served as program director of Petroleum Administration for War. This discussion was presented last week at a meeting of the marketing division of the American Petroleum Institute in Denver.

In marked contrast to the postwar decline in most so-called heavy industries the production of crude petroleum and equivalents is now at an all-time peak. The present level worldwide, exclusive of Russia, is higher than the wartime peak reached a year ago by 4 per cent or 300,000 bbl. daily. In the United States, production is above the wartime peak monthly production by about 1 per cent, in spite of the shutback in Navy Reserve production at Elk Hills of about 60,000 bbl. per day.

Relatively, refining operations are not quite as high and, therefore, crude oil is going into stocks this year compared with heavy drafts on crude stocks last year. Nevertheless, worldwide refinery runs are about 1 per cent above the peak wartime runs of a year ago, the gains in foreign areas being more than sufficient to offset a decline in the United States. In the United States, runs are 175,000 bbl. per day below the wartime peak, or 3½ per cent. Almost all of this decrease is in California, resulting from the shutback in Elk Hills production, elimination of tank car movements of West Texas crude, and reduction of local crude stocks to approximately minimum working levels. In foreign areas, new and rehabilitated capacity has been brought into operation to the extent of about 250,000 bbl. per day. An analysis, by areas, indicates that foreign refineries are at capacity and domestic refining operations are within 1-2 per cent of maximum economic capacity. By this I mean that, while physically considerably more crude could be refined, the added crude required could be moved to refineries only by abnormal transportation means—such as tank cars—and at prohibitive costs.

Requirements Near 1945 Level

Let us turn now from refining operations to requirements. It is of interest that while over-all product output was higher than last year, over-all requirements are almost identical. This is evidenced by the higher buildup of stocks as compared with last year. During June of this year, for example, product stocks accumulated at the rate of about 200,000 bbl. per day, while at the same time last year the stock buildup was about 150,000 bbl. per day. Military requirements are, of course, far less than last year, but civilian requirements have increased almost as much as the military decreased.

In forecasting the future, we start with the present demand for products. Outside of the United States, and again excluding Russia, we have projected an increase of 23 per cent in 1950 compared with this year. In volume this is about a 550,000 bbl. per day increase. Breaking this down into residual and all other products, we find that the residual increase is only 14 per cent, or 130,000 bbl. per day, while other products—principally gasoline, kerosene and distillates—increase 29 per cent, or 420,000 bbl. per day. The reason the residual increase is relatively small is that requirements in 1946 are abnormally high as a consequence of the war and the coal situation. We predict that by 1950 the increases in foreign crude production and refining will at least equal the increases which have taken place in foreign demand. The reason is apparent—foreign crude oil can be obtained at less cost than domestic crude oil. However, in 1947 and 1948 we expect foreign demand to outstrip increases in foreign refining capacity because of unavoidable delays in completing new foreign refining facilities on the large scale indicated to be required.

The projections for foreign areas are based on the assumption that political and military conditions will become sufficiently stabilized by the end of this year so that developments can proceed unhampered, except for delays in obtaining materials. It is also assumed that while the general economic situation will improve progressively throughout the period, coal supplies, because of limitations on either production or coal transportation, will not be adequate to meet all requirements. As a result, an upward trend in residual fuel oil demand through conversions from coal to oil is anticipated, which will more than offset declines in military demands. Further, it is assumed that by the end of this year dollar loans will have been made and that present foreign rationing, due to lack of dollars, will be eliminated in 1947 and thereafter.

Most marketers in the United States are interested in foreign projections only to the extent that they influence operations in the United States. Exports from the United States are the end result of the foreign supply and demand situation.

Our estimates of product exports are as follows:

Year	Bbl. per day
1946	350,000
1947	375,000
1948	400,000
1949	300,000
1950	180,000

Naturally, if the assumptions concerned with free trade and elimination of restrictions on consumption in foreign areas do not materialize, the exports would be lower than estimated. The significance of these figures is that while foreign demands will increase rapidly, not much new refining capacity can be completed before 1949 because of delays in obtaining materials, currency difficulties, and present political troubles in the East Indies. In 1949 and thereafter it was assumed that new capacity would be completed at a higher rate than new demands, with a resultant decrease in the purchase of relatively high cost products from the United States. In our opinion, 1948 is the year to watch. At this time, high export requirements will be added to high domestic requirements, and facilities may not prove adequate to carry this imposing burden.

Turning to the domestic picture, we find that 1946 demands are running well ahead of 1941. The civilian domestic requirements for the year, based on actual to date and estimates for the last half of the year, are compared with 1941 as follows:

	Per cent
Gasoline	up 5
Kerosene	up 7
Heating oils and diesels	up 18
Residual fuel	up 19

It should be borne in mind that these comparisons are for civilian requirements only and do not include military or export demands, which, in most cases, have increased even more over 1941.

Looking to the future, the following changes in domestic civilian requirements from 1946 are foreseen:

Gasoline.—Civilian aviation gasoline requirements are expected to increase so rapidly that accurate predictions are difficult to make. In general, we look for a 1948 demand double that of 1946 and in 1950 almost three times that of 1946. Civilian use of jet propulsion fuel is not expected to be an appreciable factor in this period.

Civilian motor gasoline consumption estimates are based on the following assumptions: (1) That the number of passenger cars in use in 1948 will be 4,750,000 more than the average in use this year; (2) that in 1950 the cars in use will be 33,000,000, which is 3,000,000 higher than 1948 and 7,750,000 higher than this year's average.

As regards consumption, the past trend reflects a continued increase in the use of gasoline per car in service. It is felt that the factors behind this trend will continue, but that the effect will be nullified by the increased fuel efficiency foreseen in cars produced in 1949 and 1950—and possibly to some extent in 1948.

Truck and bus consumption are expected to be 15 per cent higher in 1950. Agricultural use, it is believed, will decline about 14 per cent in this period because of a projected switch to diesel, while miscellaneous uses have been figured to increase 12 per cent. The weighted average of these individual estimates results in a projected increased civilian requirement of 5 per cent in 1947; 15 per cent in 1948; 20 per cent in 1949; and 23 per cent in 1950 above the 1946 level.

Kerosene.—Civilian demand for kerosene in 1950 is expected to be about 7 per cent higher than in 1946. The principal gain will be in demand for heating purposes. Kerosene consumed by tractors is expected to decline about 2,000,000 bbl. as a result of competition from diesel units. Other uses—such as fuel for cooking, farm machines, illumination, and civilian jet planes—are forecast to increase about 2,000,000 bbl. per year during this period. The net increase in this product is small when compared with that of other petroleum products.

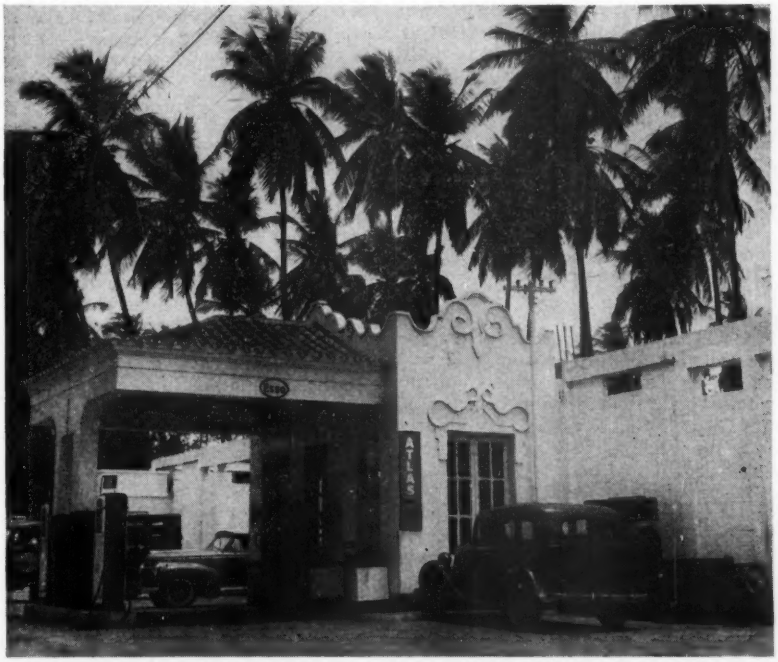
Distillate fuels.—There are two principal categories in demand for distillate fuels—home heating and diesel engine use. In 1941, home heating use accounted for approximately 70 per cent of the total domestic demand, while diesel engines used about

16 per cent. By 1950 it is estimated that the relative position will have changed to about 60 per cent for home heating and 35 per cent for diesel engine use. In the home heating field, it is estimated that the average number of burners in use in 1946 will exceed the number in 1941 by almost 400,000, or 16 per cent. In 1950 it is expected that burner installations will exceed those of 1946 by about 1,160,000, or an increase of 44 per cent. The increase in fuel requirements, however, is expected to be only 37 per cent during this period, mainly because of the increased efficiency expected in new burners.

The use of oil by diesel motors should show a really spectacular gain by 1950. Manufacturing capacity for diesel motors was about 45,000,000 hp. annually at the beginning of this year, compared with a production in 1941 of 5,000,000 hp. The availability of this capacity, together with the proved efficiency of the engines and product for certain type operations, and a very considerably enlarged force of experienced operators, mechanics, etc., all point to a greatly expanded use of diesel power in the postwar period.

Civilian diesel fuel use is expected in 1950 to be double that of 1946,

(Continued on page 82)



Foreign demand for petroleum products is expected to show a considerable increase during the next few years, particularly in areas not damaged in the war or affected by occupation. This view is of a modern filling station in Puerto Cabello, Central Venezuela

WASHINGTON WATCHING

BY HENRY D. RALPH

The Moore Amendment

WASHINGTON.—From the standpoint of the oil industry there is very little difference between the price control bill passed by the Senate and no OPA at all.

The chief difference is that with legislation the stripper-well subsidy plan would continue until next spring, while with OPA dead there will be no authority for such payments. There is also the vague possibility that the decontrol board set up by the Senate bill might sometime certify that crude oil or some particular petroleum product is in short supply justifying the reinstitution of price controls.

There seem to be no jokers or weasel words in the Moore amendment for decontrol of petroleum. It states flatly that nothing in the act shall be construed to authorize the administrator to impose or maintain price controls with respect to petroleum and petroleum products processed or manufactured in whole or substantial part from petroleum.

The decontrol board could order controls back on a particular petroleum product only on a finding that the supply is insufficient to meet the domestic consumptive demand. The word "domestic" is important. It relieves OPA of the responsibility of looking out for oil consumers all over the world. The price of petrol in Paris or the shortage of coal oil in China could not be made an excuse for continuing oil price controls in the United States.

OGD Organization

RALPH K. DAVIES is leaving Washington this week for an extended vacation at his summer home on Lake Tahoe, California, but he retains his title of acting director of the Oil and Gas Division and expects to return in the fall at least for a brief period.

Meanwhile the OGD will continue to struggle with its internal organization problems. The division now has a formal budget and the staff of the former Petroleum Conservation Division has been officially transferred to it, together with a few employes which were still being paid out of funds for liquidation of the Petroleum Administration for War until July 1. What is going on now is chiefly bureaucratic red tape. Civil Service Commission classifications and "job descriptions" are being prepared for all positions, high and low, in the new division, and at present the employes are not sure exactly what their official titles will be when things are shaken down.

The search is still on for a permanent director and several other top positions, and there is no indication that many new appointments will be made before the end of the summer.

Secretary Krug has written a letter to the heads of six other government agencies asking each to appoint a member to an interdepartmental petroleum policy coordinating committee, as suggested by President Truman's letter creating the OGD. These are the War, Navy, State, and Commerce departments, the Federal Power Commission, and the Civilian Production Administration. Appointments to this committee should be made soon, but the committee is not expected to do much active coordinating until a new director takes over the Division.

Pipe-Line Divorcement

THE time-worn proposal for pipeline divorcement has been dusted off again by Congressman Jerry Voorhis, California liberal, with the introduction of a bill (H.R. 6972) to prevent the operation of oil pipe lines by shipper-owners. The author admitted it is too late in the session to expect enactment, but thought it a good idea to keep the subject before Congress.

The bill provides that 2 years after enactment it shall be unlawful for any person or corporation, directly or indirectly to control, operate, or own any interest in any pipe line for the transportation of petroleum or petroleum products while at the same time engaged in the production, refining, or marketing of petroleum. Enforcement would be through injunctions issued by federal courts.

Maneuvers in Court

THE legal battle starts next week over the antitrust suit against the American Petroleum Institute and 21 major oil companies, but the opening skirmishes are not expected to be exciting nor indicative of the final outcome.

On July 22 the defendants are required to file answers in the U. S. District Court for the District of Columbia. Originally they were expected to file answers shortly after the suit was filed, nearly 6 years ago, but the date was postponed, first to negotiate a consent decree, then because of the war, then to resume settlement negotiations.

What the answers will be is still an official secret, but expectations are that they will be a blanket denial of all charges, a motion to dismiss the suit, or a motion to require the Department of Justice to file a bill of particulars, or a combination of all three.

The Government will consent to dismissal as to corporations which have legally dissolved since the suit filed but will insist that the 6-year-old case be pressed against the others. It will fight a motion that it be required to furnish a bill of particulars on the grounds that the complaint is sufficiently detailed to cover the charges of antitrust violation, and that such a step would be tantamount to trying the case on a preliminary motion and would give the defendants unfair advance information of the Government's evidence. Courts rarely require a bill of particulars in a civil antitrust case.

In any event the case will not get to actual trial before fall. While both sides say they are ready to go to trial they don't mean right now, this month.

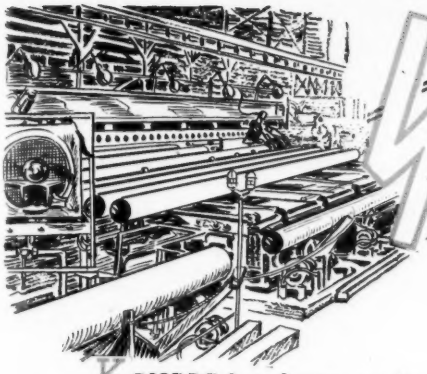
Revised Leasing Bill

THE House this week passed the Hatch-O'Mahoney bill (S. 1236) to revise the oil and gas leasing laws after adding a number of amendments which its public lands committee recommended at the request of the Interior Department. The measure was sent to the Senate for adjustment of the two versions.

The committee did not accept all the General Land Office suggestions but wrote in several which were explained as clarifying the meaning or making administration easier. These changes, if finally adopted, will not greatly modify the objectives of the measure though they whittle down the Senate version a bit.

One amendment removes from the general leasing laws lands transferred to the Department of the Interior by executive order for Indian use. The department said that the real intent

(Continued on page 82)

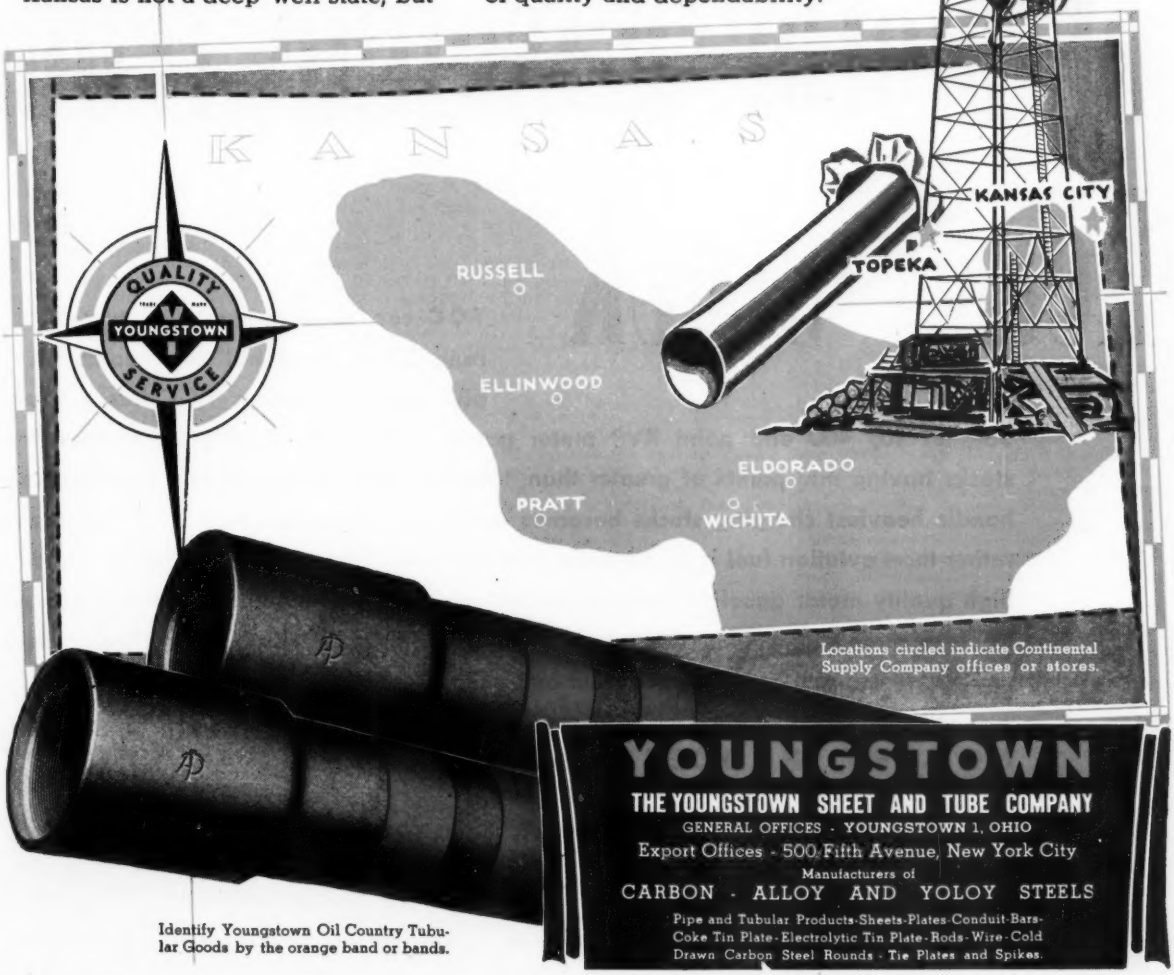


Youngstown to KANSAS

KANSAS has been an important oil and gas producing state for nearly half a century. In fact, it was the year Youngstown rolled its first oil country tubular goods--1903 --that the Sunflower State first approached a million barrels of crude production.

In its all-time output of oil, Kansas ranks fifth among the states--fifth also in 1945 production. Proven reserves have fallen somewhat during the war years, but more wells are forecast for the future and footage to be drilled is on the increase. Kansas is not a deep well state, but the drilling trend is to lower horizons, with a new depth record of nearly 8,000 feet in Meade County last year.

For over 40 years Kansas operators have found that Youngstown Oil Country Tubular Goods have the sturdiness and built in quality to meet all the exacting demands of Mid-Continent drilling and production. Here as in other areas, oil men are able to depend on Youngstown drill pipe, casing, tubing and line pipe for good performance, whether service conditions are corrosive or normal. Through long experience they have come to recognize the orange bands as the mark of quality and dependability.



Locations circled indicate Continental Supply Company offices or stores.

Identify Youngstown Oil Country Tubular Goods by the orange band or bands.

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What Others Say

WIDELY discussed and the subject of much favorable comment as to the timeliness and need for factual engineering material concerned with reactions between producing wells, well spacing, and recovery efficiencies—the Journal's recent articles on "Well Interference" are here discussed by a number of authorities. The articles were published in the Journal as follows:

1. "Well - Interference Studies Are Important in Spacing, Drainage Problems," April 13.

2. "Well - Interference Effects," April 20.

3. "Interpretation of Interference Tests in Terms of Permeability," May 4.

4. "Well Interference and Reservoir Drainage," May 18.

Kenneth B. Barnes, the author, is engineering editor of The Oil and Gas Journal.

Actual Interference Several Times Apparent Amount Measured

Sirs:

The interference tests described by Kenneth B. Barnes in recent issues of The Oil and Gas Journal represent a timely contribution to the questions of well spacing, drainage across property lines, and the adequacy of development programs. Even though the studies were made in limestone reservoirs, they point the way to the possibilities of similar investigations that may well be undertaken in other types of producing formations.

The fields studied in Kansas are all under water drive, and all of them except Boyd produce large quantities of water with the oil. The actual volume of water produced with the oil is not known, since it is not usually measured, or if it is, such measurements are only spasmodic and the results are not generally deemed of sufficient importance to justify reporting, or in many cases to even be recorded. The intensity of the water drive in Kansas pools is so great that when the wells are shut in they quickly stabilize or do so within a few days. Quick stabilization means that the total fluid (oil and water combined) withdrawn per day from the reservoirs is continually and almost immediately replaced by practically an equivalent volume of water.

That being the case, it is desirable to examine the results of the tests so as to determine, if possible, the unobserved or unobservable effects of the influx of water into the reservoirs, while the fluids are withdrawn from the test wells. In order to find out some of these effects the total fluid production per day from each pool needs to be ascertained. The oil production per day is available from the records—monthly—of the conservation division of the state Corporation Commission, but the water production must be estimated. This has been done, as shown in the accompanying table, by computing from the volumes of water produced by the test wells in each of the different pools, the per cent of water in the total fluid produced per day. This percentage may then be applied to the whole field and the total volume of reservoir fluid produced per day calculated. It is recognized that this is neither an accurate nor an average figure, but it is believed to be a fair estimate of the water and total fluid for the different pools. Once this estimate has been obtained the production of the test wells may be expressed as an approximate per cent of the reservoir fluid produced by the entire pool under its normal—January—allowable. This then gives the engineer some idea of the magnitude of the influence of the pumping test wells upon the behavior of the entire reservoir during the test period.

In the Boyd pool the pumping test well removed 52.5 per cent as much fluid as was normally produced by the pool; at Richardson, the test wells removed about 12 per cent as much fluid as was produced during normal operations; the Silica test wells removed about 15 per cent as much. Where such small proportions of the normal production of the pool are removed by the test wells, it is surprising that the idle wells, whose fluid levels were measured in order to ascertain whether or not interference was evident, showed any evidence of interference at all. In the case of wells which failed to show any interference they unquestionably received water from the reservoir during the test period and such water masked the interference effects completely. This was conclusively shown by the two wells in Silica, reported as not showing interference, but which showed 18 and 19-ft. fluid rises respectively during the 48-hour shut-in-period following the tests. Still further, in the Richardson pool well No. 10, which had shown a drop of 64 ft. during the test, had a fluid rise of 194 ft. during the 48-hour period following the shutdown of the pumping well. It is logical to conclude from this test that about 130 ft. of fluid rise must have been taking place during 48 hours of the test, but that this quantity was unobservable or undetected in the analysis of the results. In general, in tests of this type the lapsed time after the close of the pumping period and before final determination of fluid levels in the idle wells should be equal in length to the pumping period.

Wells which were reported as "unaffected" must have been influenced sufficiently by the continued influx of water into the reservoir to obscure the effects of interference, and wells which showed a rise of fluid during the tests and which are therefore classified as unstable, did so in spite of the interference effects. The logical conclusion to be drawn from the entire series of tests is that the actual interference which took place between the pumping wells and their offsets was several times greater than the apparent amount measured.

A summary of the data for the various pools is shown in the accompanying table.

DR. E. A. STEPHENSON,
Head, Dept. of Petroleum Engineering, University of Kansas, Lawrence.

SUMMARY OF RESULTS OF INTERFERENCE TESTS IN KANSAS*

	Boyd	Carmi	Richardson	South Silica
Total oil allowable per day	656	2,723	1,661	3,619
Test oil produced per day	344	120	198	557
Test water produced per day	0	(?)	524	176
Test total fluid produced per day	...	120 to 216	722	733
Average per cent of water during tests	0	(?)	28.4	24
Calculated water production by pool per day	0	....	4,380	1,156
Calculated total fluid produced by pool per day, normal operations	656	(?)	6,040	4,775
Test output expressed as per cent of normal fluid production per day	52.5	(?)	11.9	15.3
Total wells in pool	27	89	59	121
Number of wells used in test	11	9	29	34
Number of wells pumped during test	1	8	2	2
Per cent of field wells used in test	37	10	49.2	28.1
Per cent of wells actually pumped during test	3.7	9	3.4	1.65
Per cent of wells in test that showed interference	40	....	40.7	†21.8
Per cent of test wells not stable	50	....	44.5	78.1
Per cent of test wells with interference not detected	10	....	13.8	0

*All production data are barrels per day. †Two wells are reported as not showing interference, but these both showed definite fluid rise when the pumping well was shut down; hence there must have been interference.

Factual Cases Wanted in Studies By A.P.I. Spacing Committee

Sirs:

You may be interested to know that some discussion of interference phenomena was developed at the June 5 meeting of the A.P.I. Mid-Continent committees on production technology and secondary recovery. Other work prevented Kenneth B. Barnes from attending in which event the subject would have been more thoroughly discussed. The technology committee regards the Barnes' series as being important and we herewith submit our request for 20 copies of the reprint to facilitate committee study. Obviously the series will be of interest to the well-spacing committee headed by H. H. Kaveler.

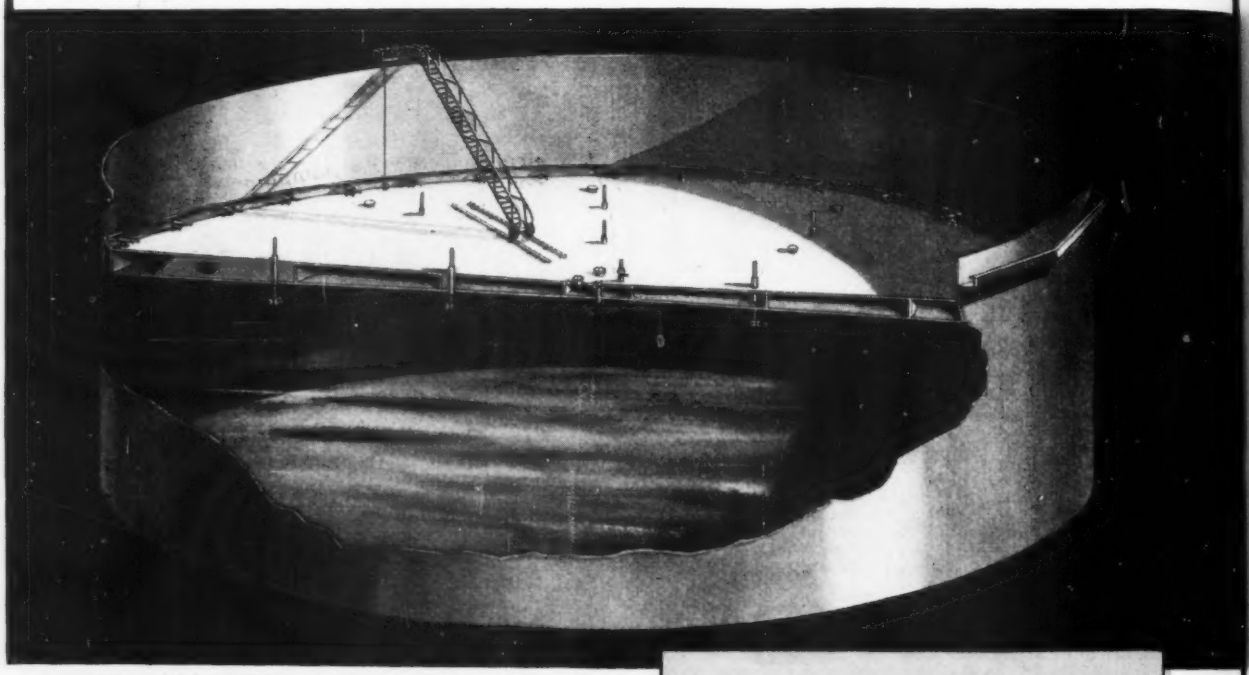
The subject is quite complex; however, the case-history technique employed is valid and preferred as a qualitative method for presenting the subject. It is noted that single-fluid cases were used chiefly. In order to predict interference, drainage and migration data are required on distribution of physical characteristics including compressibilities, PV conditions, mobilities, effective permeabilities and time-rate factors of production. Even with these data, adequate mathematical solutions have not been published and great accuracy is hardly expected to be proved due to reservoir complexities. There is a need for development and publication of the methods applicable to such predictions. The authors need not attempt to solve the general problems but would do well to first work out simple

(Continued on page 77)

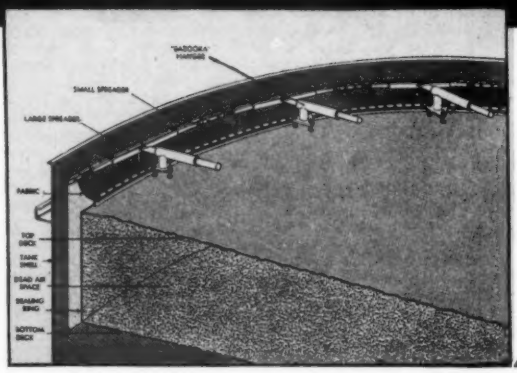
A FLOATING ROOF AGAIN..

The incident reported on the opposite page proves again the effectiveness of floating roofs in protecting crude oil and refined petroleum products from fire. The improved Horton *Double-Deck* Floating roof is your *best* insurance against fire losses on flat-bottom tanks storing volatile products that do not boil at normal atmospheric temperature. This roof floats directly on the liquid in the tank, moving up and down as the tank is filled and emptied. Thus the active vapor space, which is present above the liquid surface in any tank with a fixed roof, is eliminated. The elimination of the vapor space, *and oxygen,* removes practically all danger of combustion within the tank. The space between the rim of the roof and the tank shell is effectively closed with a seal of fire resistant material.

A few of the outstanding construction features which make the Horton Double-Deck Floating Roof so effective in preventing fires and in reducing evaporation losses are listed on the opposite page. For more complete details, write for new Bulletin B.



The efficiency of a floating roof depends largely upon the effectiveness of the seal between the rim of the roof and the tank shell. The diagrammatic view at the right shows the seal on a Horton Double-Deck Floating Roof tank with a butt welded shell. It consists of a sealing ring with vertical flexures at two foot intervals, the top of which is joined to the deck by a continuous curtain of gas-tight weather-proof fabric. Self-contained "bazooka" hangers mounted on the top of the roof deck support the sealing ring and apply an outward radial pressure at each flexure. This pressure, combined with the circumferential forces exerted by the flexures themselves, make the sealing ring hug the tank shell tightly at all times.



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cases for transients and pressure changes in single-fluid systems such as gas or dead oil. Theoretically, transmission is at the speed of sound but readable measurements in wells require considerable flow and are modified by the factors influencing flow and by time. It is certain that the series will have its effect on production thinking especially with regard to spacing and drainage questions.

Mr. Barnes discussed the series with me before printing and I was impressed with the great amount of information which he had received from many sources. It is hoped that more of these interesting and factual cases may be published.

WILLIAM L. HORNER,
Barnsdall Oil Co., Tulsa.

New Chart Reanalyzes Interference Versus Distance

Sirs:

I had read the articles on "Well Interference" as they appeared, with a great deal of interest. It seems to me that specific data on reservoir behavior such as are presented in those articles are of great value in clarifying our ideas on the subject.

I shall not undertake to discuss the entire series. It happens that for my own information I had plotted the data incorporated in the second article entitled "Well Interference Effects" on a graphic chart. Since it provides a somewhat more detailed analysis than the original article, it may be of interest. I have therefore had my rough penciled chart redrafted to put it in more presentable form and am enclosing it for your use.

This chart is designed to show the degree of interference for each individual well involved in the tests, plotted against its distance from the well being pumped. The data are plotted in four classifications:

1. Wells showing interference in the form of a lowering of the fluid level while the test was in progress.

2. Wells in which no interference was demonstrated in that the fluid levels continued to rise both during and after the pumping test.

3. Wells in which there was probably no interference. Fluid levels raised during pumping test but did not build up further afterward.

4. Wells which showed definitely that no interference occurred. Fluid level stabilized before pumping test began, no drawdown during test.

For those wells where interference was indicated, the degree of interference was further classified by plotting the lowering of its fluid level as a percentage of the drawdown in the well being pumped.

For convenience in discussion the wells may be divided into three groups on the basis of distance from the key well:

1. Wells less than 1,000 ft. distant (this includes the direct and diagonal offsets on 10-acre spacing).

2. Wells 1,000 to 1,500 ft. distant.

3. Wells more than 1,500 ft. distant.

Examining the group that are less than 1,000 ft. distant we find that seven wells show definite and appreciable interference with drawdowns amounting to more than 1 per cent of that of the key well, (maximum 17.5 per cent); three wells show interference, but in negligible degree (drawdown amounting to less than 1 per cent of that of key well); there are 12 wells in which no interference was demonstrated; 1 well in which there was probably no interference; and 3 wells in which there was definitely no interference.

The group of wells from 1,000 to 1,500 ft. distant from the key well show an almost identical distribution as to interference. Six wells show appreciable interference; 3 show a negligible degree of interference; in 12 wells no interference was demonstrated; in 2 wells interference was improbable; and 3 wells definitely showed no interference.

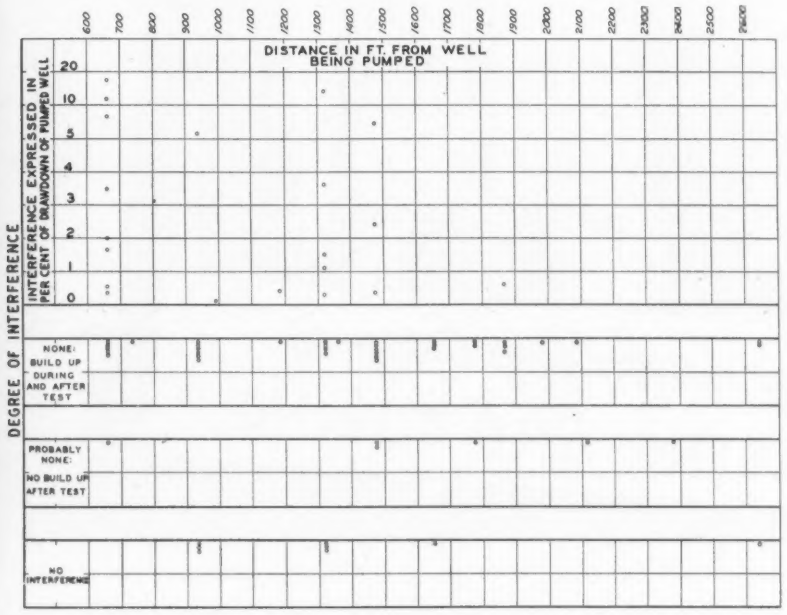
In the group beyond 1,500 ft. there is a marked difference in distribution. Only one well showed any evidence of interference and it was negligible in degree, the drawdown being only 0.6 per cent of that in the key well. Twelve wells were in the "No interference demonstrated" class; three in the "Probably none" class; and two were definitely in the "No interference" class.

These data suggest that permeability is anything but uniform throughout the reservoirs involved. The fact that wells from 1,000 to 1,500 ft. distant seem to have about the same chance for interference as those from 660 to 1,000 ft., whereas many of the closest wells show no interference at all, indicates that intercommunication is relatively easy along certain high permeability channels, and practically impossible in certain other directions.

It may be further noted that only about 25 per cent of the wells in the two closest groups showed appreciable interference; that a minority in those groups showed any trace of interference; and that interference practically ceased, or at least became so slight as to be undetectable by these tests beyond a distance of 1,500 ft. from the key well.

One conclusion that seems obvious is that in no instance could the key well, selected as the one to be pumped, be expected to effectively drain the entire test area.

STUART CLARK,
Chairman, exploration committee, Continental Oil Co., Ponca City, Okla.



ANALYSIS OF INTERFERENCE TESTS—KANSAS

Arbuckle Lime—Boyd, Richardson and South Silica Fields (Five Tests)

Data from The Oil and Gas Journal Article by K. B. Barnes

	Distance from pumped well					
	Less than 1,000 ft.		1,000 to 1,500 ft.		More than 1,500 ft.	
Total number wells in group	26		26		18	
Wells showing—	No. wells	Per cent of group	No. wells	Per cent of group	No. wells	Per cent of group
Strong interference (drawdown more than 5 per cent of that of pumped well)	4	15.4	2	7.7	0	0.0
Appreciable interference (drawdown 1-5 per cent of that of pumped well)	3	11.5	2	7.7	0	0.0
Negligible interference (drawdown less than 1 per cent of that in pumped well)	3	11.5	5	19.2	1	5.6
Interference not demonstrated (fluid level rose during and after test)	12	46.2	12	46.2	12	66.6
Interference improbable (fluid level rose during test but did not build up afterward	1	3.9	2	7.7	3	16.7
No interference (fluid level static throughout test)	3	11.5	3	11.5	2	11.1
Total showing any degree of interference	10	38.5	9	34.6	1	5.6
Total other wells	16	61.5	17	65.4	17	94.4

Many Fields Drilled Too Closely

Sirs:

We are greatly interested in your series of articles on "Well Interference." This subject is a vital one to the industry. The data you are publishing should help solve the difficult well-spacing problem. We regret that we have no concrete information to offer, showing effect of interference, but we are convinced that in the past the wells have been drilled too closely in many fields.

M. G. CHENEY,
President, Anzac Oil Corp., Coleman, Tex.

Factors for Equivalent Rows of Wells

Sirs:

Well interference between producing and injection wells is important in petroleum production. It varies with the shape of reservoirs and with the number of well rows. Three equivalent rows of wells saturate a reservoir, that is, the producing capacity of the wells on four, or more, equivalent

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rows is essentially no greater than the producing capacity of the wells on three equivalent rows.

The number of wells that can be located on one row varies with the strike length of reservoirs. A linear reservoir could have 100 wells on one row provided the strike length were sufficient. Three hundred wells, three rows, would saturate such a reservoir. On radial reservoirs having no primary gas caps, about 120 regularly spaced wells or about 90 wells having staggered spacing constitute an equivalent three-row well system. Accordingly, between 90 and 120 wells saturate a radial reservoir relative to edge water. The structure of elongated reservoirs is between that for radial and linear reservoirs. The number of wells that can be located on three equivalent rows varies primarily with the ratio of the major to minor axes.

The interference factor for one equivalent row of wells is about 64 per cent; two rows, about 38.4 per cent; and three rows, about 26.2 per cent. These factors apply to oil production by encroaching, or injected, edge water and to oil production by primary gas caps. However, the number of wells that can be located on an equivalent three-row system relative to a primary gas cap may be several times the corresponding number of wells relative to edge water. Well interference in producing oil by water under various conditions as to structure and stratigraphy is illustrated in the forthcoming articles on "Oil Production by Water."

PARK J. JONES,
Production consultant, Houston.

Interference in Some Limestones Covers Greater Distances

Sirs:

Let me say in the beginning that I think a nice piece of work has been done on these four articles, and I hope that more similar data can be published in the future. Field data have been too confidential.

The data presented apply primarily to erratic limestone reservoirs, and cannot be generalized. However, the fields in the Burbank area have been covered in regard to sandstone production, as is the case in the reference to Oklahoma City; the latter I am familiar with. In this regard, I believe the data on sandstone reservoirs is usually more conventional than that regarding limestone reservoirs. Since interference varies so erratically even in the same limestone reservoir, I see no reason why we can generalize as to all limestone reservoirs. Porosity, texture, permeability, pressure, free gas, gas in solution, solution cavities, etc., all can vary within a limestone structural trap. Furthermore, calculations based upon the performance of electrical models or estimates following the equations of Muskat have no direct field value, because such studies merely indicate that interference can exist under ideal conditions.

I firmly believe that interference can be detected in some limestones beyond the maximum distance recorded here or those mentioned by Amstutz and Stephenson. Our experience at West Edmond has proved that 40-acre spacing alone is not a cure for well interference in limestone reservoirs. One idea which was not stressed in the articles is the elapsed time between well-completion dates and its effect upon the initial production, pressures, gas-oil ratio of the offset wells drilled later in limestone areas. This point, however, was covered in the reference to Burbank and Oklahoma City. However, we must always keep in mind that even in a sandstone reservoir there is a difference between interference as such and high ultimate recovery by more or less long-distance drainage. For example, gas caps have been known to migrate long distances during shut-in periods, whereas the oil migrated scarcely at all.

I think these articles exemplify the practical conclusion that well performance is a function of time, texture, distance, permeability, and water energy. Yet, it cannot be calculated accurately in advance, because each group of wells presents an individual case. This point has been well covered in the articles. With reference to the limestone reservoirs, it seems that all of these tests were made on wells that had reached the pumping stage. I am sure that a different set of results would occur if we were dealing with flowing wells, where we have some free gas as well as gas in solution.

W. F. CLOUD,
Professor of Petroleum Engineering, School of Petroleum Engineering, University of Oklahoma.

Well Mile From Four Producers Showed Drawdown

Sirs:

Mr. Barnes is to be commended for bringing a problem of considerable interest to the attention of the industry in a compact and understandable manner. It is to be hoped that his articles will stimulate others to make similar contributions, as a compilation of a large amount of data from many fields and areas is highly desirable for the study of this important problem.

My personal experience has been limited to sand-type reservoirs, in some of which we have found conditions similar to those as outlined by Mr. Barnes. For example, in making bottom-hole shut-in pressure surveys in several areas we have found that the values obtained are sensitive, in general, to the total field rate of withdrawal. Thus, individual well static surveys made during times of high production will tend to give average shut-in pressures which are some 1 to 2 per cent lower than those noted at lower production rates. In another instance, an outpost well was completed at a distance of approximately 1 mile from a group of four producing wells. Its shut-in pressure was found to be lower than the initial static of the discovery well thus denoting that a pressure gradient had developed between the outer limits of the reservoir and the area of initial production. It is to be cautioned, however, that pressure communication between two areas does not necessarily mean that large-scale fluid movements are taking place, particularly at relatively low-pressure differentials in nonuniform, low-permeability sands.

Perhaps the most noteworthy example in California of large-scale reservoir fluid movements due to extreme reservoir pressure anomalies is to be found at Kettleman, as outlined by E. W. McAllister, A.I.M.E., Petroleum Development and Technology, Volume 142 (39), 1941.

N. VAN WINGEN,
Richfield Oil Corp., Los Angeles.

Summarizes Five Factors Shown By Interference Tests

Sirs:

The subject of well interference and its relation to well-spacing studies has been almost as controversial a subject as well spacing itself. Mr. Barnes, in his recent series of articles has made an excellent presentation and he is to be complimented both for his discussion and the pictorial analysis of the subject.

Interference data have been used for at least 10 years to substantiate requests at hearings before state regulatory bodies for spacing rules. In these hearings, it is usually necessary to enter into the commission records testimony that will prove that one well will drain the spacing unit requested.

(Continued on page 163)

Field Trip to Water-Flood Properties Scheduled

OTTAWA, Kans. — Several eastern Kansas water-flood properties will be inspected at the next meeting of the water flood operators of this territory. L. L. Brundred of Brundred Oil Corp., Ottawa, is chairman for the forthcoming program.

The schedule will commence with a luncheon at the North American Hotel in Ottawa on Tuesday, July 23. The group then will be supplied with maps showing road directions to different water drive projects to be visited. This program will be the latest of a series of informal monthly sessions to which all water-drive operators, engineers, and other interested parties have been invited, and follows the meeting last month at Independence, Kans., where well spacings, well patterns, and flooding rates were discussed.

Saskatchewan to Require License for Drilling

REGINA, Sask.—New oil and gas regulations issued by the Saskatchewan lands and mines department provide that no drillng can be commenced or carried on without a license.

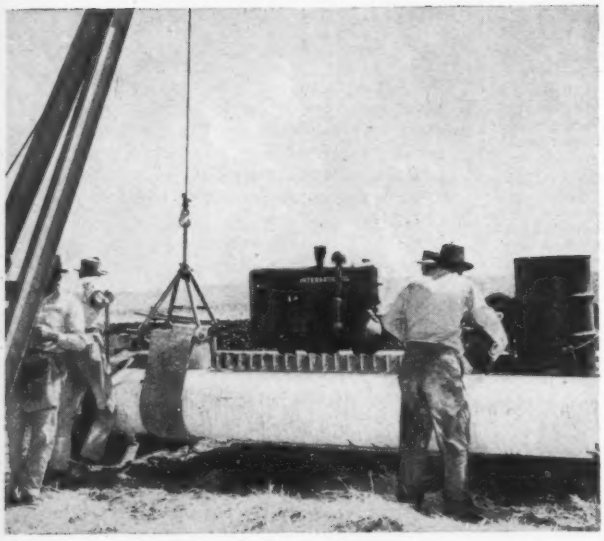
License applications to the supervisor of mines at Regina must specify the qualification and previous experience of the person to supervise the actual drilling, a description of location, the purpose of drilling and the intended depth; and must include a map showing location and proof of legal right to both surface and mineral rights. The license fee is $10. The regulations provide a license may be cancelled when operations have not started within 90 days, but a 30-day extension may be granted where operations are discontinued due to conditions beyond control of the licensee.

Petroleum Shipments To Territories High in 1943

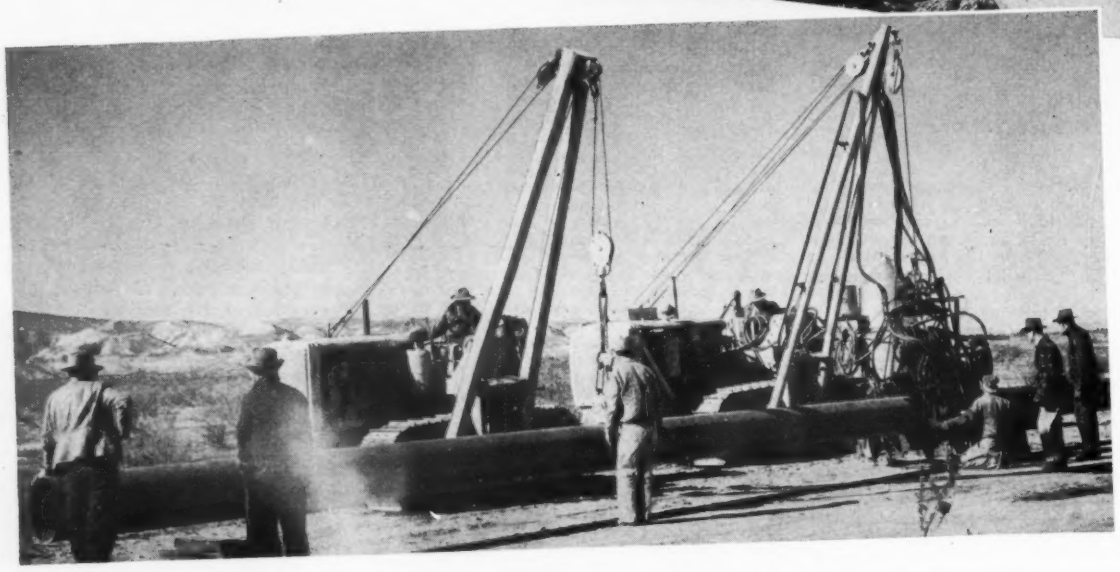
WASHINGTON.—Total value of gasoline shipments and petroleum products from the United States to its territories and possessions hit a peak in 1943, for the war years from 1942 through 1945, according to reports from the Bureau of the Census.

Value of petroleum shipments during 1943 totaled $29,780,000 and were divided as follows: To Alaska, gasoline, valued at $940,000, other petroleum products, $4,515,000; Hawaii, gasoline, $8,926,000, other products, $14,773,000; Puerto Rico, all petroleum products, $492,000; and to the Virgin Islands, all petroleum products, $134,000.

Pumping Starts



Above: Bending machine operating on Somastic-coated pipe on the San Joaquin Valley pipe line. Right: Laying pipe line through an orchard required numerous bends in order to save the trees



Pressure-weld machine getting lined up on joint of new San Joaquin Valley line

STANDARD OIL CO. OF CALIFORNIA started pumping crude oil at Coalinga, Calif., on July 1 through the recently constructed 176-mile, 18-in. and 20-in. crude-oil line which made its first delivery on July 5 at the Los Medanos tank farm which serves Standard's Richmond refinery on San Francisco Bay. The new line cost $4,000,000. The 276,000 bbl. required to fill the line is 2½ times the daily delivery capacity of 110,000 bbl. daily at normal operating pressures at which oil travels 3 m.p.h. This is the largest diameter crude oil line in California.

The functions performed by the new line permit the reconversion of the Stanpac line to natural gas. Stanpac, owned by Pacific Gas and Electric Co., Public Service Co., and Standard was switched to crude in the early days of the war because of tanker shortage and submarine threats.

Crude oil handled by the new line is San Joaquin light and Kettleman type. The company's policy will continue to have heavy crudes, other oils, and natural gasoline go by pipe line west to Estero Bay, whence they will be shipped by tankers to Richmond, Calif., and other consignment ports.

The new line has 167 miles of A. O. Smith Corp. 18-in. electric-weld pipe: transverse yield, 52,000 psi.; minimum longitudinal yield, 42,000 psi.; minimum ultimate strength, 72,000 psi.; minimum per cent elongation in 2 in., 22 per cent. In addition the line has 9 miles of 20-in. used pipe from company stock.

Laying of the line was contracted by Bechtel Brothers-McCone Co. On 40 miles of the line pressure welding was applied; the remaining 136 miles were welded by the conventional electric-rod welding method.

Gamma-ray inspection was used on several welds as a daily routine procedure. In doing this, photographic negatives packaged in lightproof strips are wrapped around the weld. A capsule of radium is lowered

In New California Crude-Oil Pipe-Line

Welding on the San Joaquin Valley pipe line

Hydraulic clamp for putting Somastic coating on line

Standard of California Operates 176-Mile 18 and 20-in. Artery

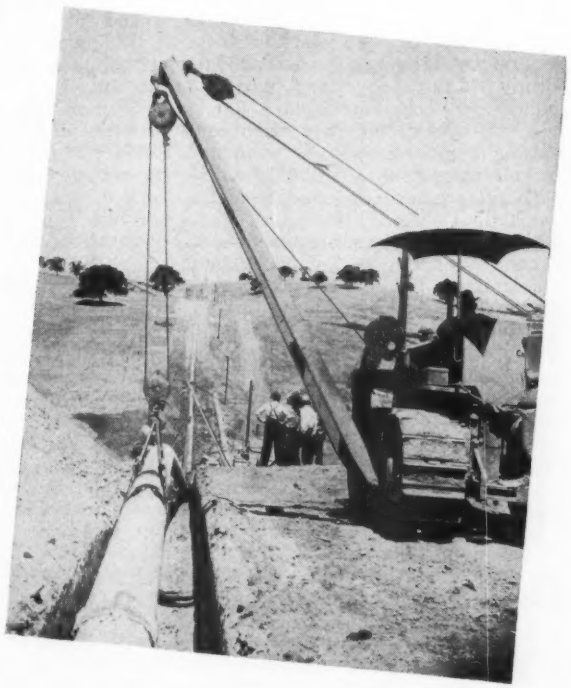
through an opening to a position approximately in the center of the weld's diameter. Rays from the radium pass through the weld and any defects are recorded on the negative.

Somastic coating was applied on 100 miles of the line. In connection with this operation, recently developed hydraulic clamps were utilized for more efficient application of coating at the small areas at the ends of the joints which are customarily left bare until welding has been completed.

By the construction of a booster station at Los Banos it has been possible to raise throughput from 85,000 to 110,000 bbl. daily. Telemetering circuits will be provided in the existing telephone system in order to transmit flow-meter readings from both ends of the line to the gager's office at Los Medanos.

This is the second oil pipe line built by Standard from the San Joaquin Valley to the San Francisco Bay area. From 1903 to 1929 all Valley crude oil was moved to Richmond, through a 280-mile line from Bakersfield.

Subsequently crude oil from all Valley fields was moved to refineries via Estero for transhipment by tankers until the threat of Japanese submarines which led to converting the Stanpac lines from gas to crude. Recent increased demands at the Richmond refinery exceed the capacity of the Estero line. Consequently the new 176-mile line became advisable, which has been laid parallel to the Stanpac system.



Lowering in on the new pipe line

WATCHING WASHINGTON

(Continued from page 70)

of the Senate version was to permit leasing of certain lands in New Mexico withdrawn for possible addition to the Navajo Reservation, but since no executive order was involved the bill would not affect them and the department already has authority to lease them for oil and gas.

The provision for a flat royalty of 12½ per cent is altered so it will not apply to leases which are believed to be within the productive limits of any deposit as determined by the secretary. Without these changes in language, the GLO said, the bill would require the reduction of royalties now being paid on productive leases in known oil fields, resulting in loss of government revenue in many areas, including $2,000,000 in Rangely, Colorado, and $1,000,000 in Elk Basin, Wyoming. The House committee version would still apply the 12½ per cent royalty to leases on new discoveries.

Bids for Big Inch

A NUMBER of bids to purchase or lease the two big-inch oil pipe lines have been received by War Assets Administration, and officials are confident that a good many more will be filed by the July 30 deadline.

All the sealed bids will be opened publicly July 31. but from preliminary negotiations WAA officials understand that several will be for a "fair valuation" and will comply with the WAA policy that the lines be used as oil carriers or be maintained for emergency conversion to oil if necessary. So far as is known, no major oil company has submitted a bid as yet, but several inquiries from consulting engineers may be prompted by oil companies.

Offers are also expected from organizations outside the oil industry which propose to operate the lines as common carriers as an investment, and at least two firms bids are expected for conversion of the lines to natural gas, though the announced policy of WAA is to require that the lines be kept available for oil if such an arrangement can be worked out. If no acceptable proposals are contained in the July 31 opening, all bids will be rejected and the pipe lines will again be advertised for sale or lease.

Foreign Demand to Rise

(Continued from page 69)

whereas the use in 1946 is double that of 1941. Large increases are expected in the category of railroads (railroad use in 1950 is projected at nine times that of 1941), vessels, smelters, mines and manufacturing industries, tractors, and construction machinery, etc. Truck and bus consumption in 1950, it is believed, will be many-fold that of 1946. Of the more than 100 per cent gain anticipated in total diesel use, one-fourth will be due to the construction and use of diesel-driven trucks.

Residual fuel oil.—The civilian onshore demand for residual fuel oil, excluding bunkers, is expected to increase about 6 per cent in 1947 and the same in 1948 over the 1946 level. However, in 1949 it is projected to drop to the present level and fall about 1 per cent below that in 1950. This is based on the assumption that industrial activity in the United States will decline in these 2 years, particularly in 1950. As residual requirements are determined by competition with other fuels and are, therefore, particularly sensitive to price changes, our projection was based on a continuance of the price relationship of residual and coal established during the past few months. In general, the demand is expected to be in balance with byproduct residual production world wide. As it is necessary to move byproduct residual fuel oil, an increase in byproduct residual production world wide over that estimated herein would, no doubt, be accompanied by a correspondingly higher demand—with the price mechanism serving to maintain the balance between supply and demand. Similarly, if there is a shortage of byproduct fuel oil production, the price might be expected to rise to reduce the demand to the byproduct supply level.

In regard to other products—increases are expected in lubricating oil (19 per cent), asphalt (35 per cent), and miscellaneous products (about 15 per cent in 1950 above the 1946 levels. Liquefied petroleum gas consumption is expected to be 30,000,000 bbl. this year compared with 11,000,000 in 1941; in 1950 it is projected to be 14 per cent above 1946.

Other Opinions Expected

As mentioned in the beginning, we do not expect agreement with all the assumptions used in this forecast—for example, economists differ widely as to the timing when a peak in the present boom will be reached. However, a study of past trends in petroleum consumption in relation to changes in business conditions indicates a considerable time lag between the two and that the ultimate effect of a change in average business conditions is outweighed by other factors which more directly affect consumption. It is for this reason that we are not too worried about disagreement in views as to the exact timing of a change in business conditions. Other things being equal, it could hardly affect any of the estimates before 1950, whereas the problems of supply and distribution will probably be most acute in 1948. The reason for this, as previously indicated, is that domestic requirements are expected to increase rapidly during the next year or two before tapering off, while exports, it is believed, will be maintained, or increased, during this period. At the same time difficulties may be encountered in obtaining sufficient materials in time to provide all of the supply and distribution facilities which would be desirable to handle the large volume of business projected.

As to the accuracy of estimates—it cannot be claimed that, over the period described, the error will be less than 5 per cent plus or minus. If actual consumption turns out to be 5 per cent higher than estimated, the supply difficulties in all branches of the industry will be strained to the utmost. If consumption is 5 per cent less than estimated, it would still be at a much higher level than any previously experienced and will require the utilization of practically all efficient facilities.

Summarizing, estimated consumption of the major petroleum products in 1950 compares with 1946 as follows:

	Inc. 1950 over 1946 (per cent)
Foreign requirements	23
Domestic civilian requirements:	
Gasoline	23
Kerosene	7
Distillate oils:	
Heating	37
Diesel (including bunkers)	110
Residual fuel oil	*7

*Decrease.

Petroleum Course Approved

BUTTE, Mont.—Montana School of Mines' faculty has approved a postwar revision of curricula and teaching methods, including the addition of a course in petroleum engineering which was requested by a group of Montana oil operators and engineers.

DEATHS

Thomas G. Henrick, 84, West Texas oil man and rancher, died July 8 at his home in Abilene, Tex.

Guy F. McGee, 55, independent oil operator, died July 9 at his home in Tulsa.

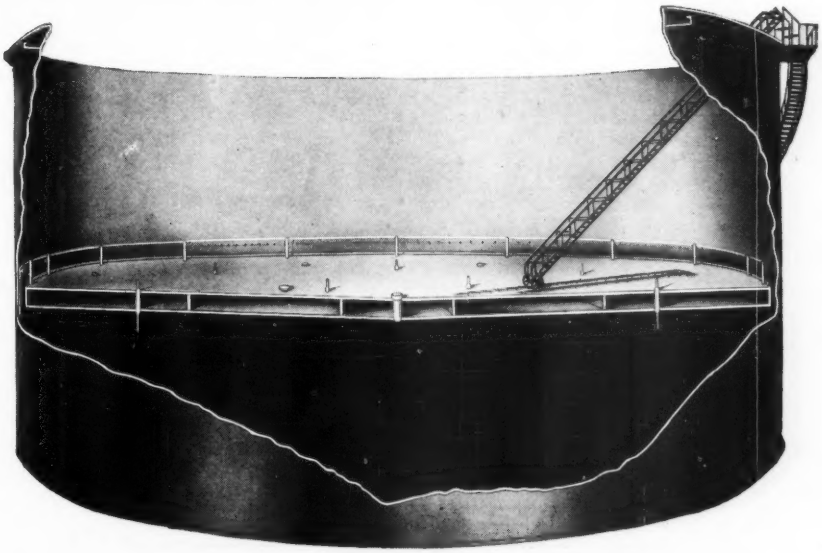
Ernest E. Wood, 75, oil producer and drilling contractor, died July 7 at his home in Eldred, Pa.

H. C. Spillman, 48, died July 14, in Tulsa. He was associated with The Texas Co. in the production department.

VAPOR SAVING ROOFS

The GRAVER PONTOON FLOATING ROOF

An improved double deck floating roof of simplified construction with positive vapor pressure seal.



The Graver Pontoon Floating Roof is ideally suited for vapor saving storage under the following conditions:

- For finished products in tanks too isolated for practical manifolding or in tanks where excessive differences in filling and withdrawal may exist, such as a water terminal.
- For "sour" crudes. The roof lies entirely upon the surface of the liquid and eliminates any vapor space and the possibility of corrosion.

Note these features of the Graver Pontoon Floating Roof:

1. Double Deck insulates stored liquid against boiling.
2. Vapor tight seal is doubly actuated by springs *plus vapor pressure.*
3. Secondary seal provided if desired.
4. Smooth deck—no pockets for accumulation of dirt or water.
5. Screened open drain. Pipe drain optional.
6. Adjustable supports.
7. Seal composed of 16 gauge heavily galvanized or stainless steel continuous shoe and long lasting synthetically treated fabric.
8. Simplified construction.

GRAVER
VAPOR SAVING ROOFS

For complete information regarding the Graver Pontoon Floating Roof or other Graver storage equipment, consult the Graver office nearest you. Your inquiry incurs no obligation.

GRAVER TANK & MFG. CO., INC.

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PHILADELPHIA PITTSBURGH PORT ARTHUR, TEX.

Design plan of United's new Carthage plant.....

170,000 Gallons of Liquid Products Per Day

by George Weber

PROCESSING 150,000,000 cu. ft. of raw gas daily to extract a total of 170,000 gal. of liquid products, is the design plan of the new United Gas Pipe Line Co.'s condensate-natural-gasoline-recovery plant in the Carthage, Texas, gas field. The gas so treated is collected in a gathering system including more than 100 miles of lines serving 81 wells in the field. After processing the gas to remove condensate, 100,000,000 cu. ft. is processed further to recover natural-gasoline components while 50,000,000 cu. ft. passes directly to the low-pressure gas line.

This field includes more than 210,000 acres of proven territory, and produces from three formations; the Rodessa, at 5,000 ft. depth; the two Pettit, upper and lower zones, 5,700-6,000 ft.; and the Travis Peak at 6,100-6,500 ft. The gas received at the plant contains an appreciable amount of heptanes and heavier, i.e., condensate material. A typical analysis of the average raw gas produced is as follows:

	Per cent
Methane	91.35
Ethane	3.89
Propane	1.48
i-Butane	0.36
n-Butane	0.51
i-Pentane	0.27
n-Pentane	0.23
Hexanes	0.49
Heptanes plus	1.42

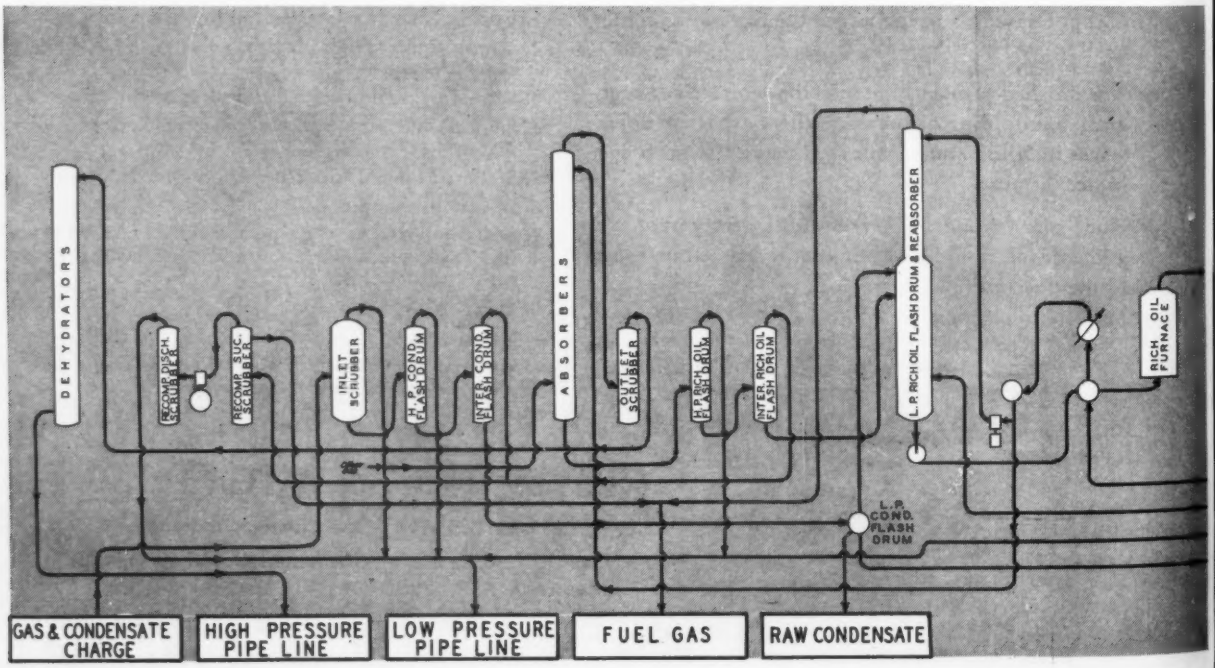
The products made at the plant include kerosene, motor fuel, naphthas, butanes, natural gasoline, and liquefied petroleum gases. These products will be handled by tank car, loaded at a 24-car loading rack, and by tank trucks as well. Storage for 2,768,000 gal. of products is provided.

Equipment Employed in Plant

Part of the power for the plant is supplied by two 50,000-lb.-per-hour 250-psig. water-tube boilers. One 85-hp. gas-engine-driven recompressor is also installed. Two high-pressure absorbers, each with 20 trays, are included, along with a 14-tray reabsorber, two 20-tray stills, a 12-tray stripper tower, 30-tray debutanizer, 21-tray condensate fractionator tower, deisobutanizer with 60 trays, and a deethanizer tower of 30 trays.

Designed to handle 150,000,000 cu. ft. of raw gas per day, at 1,200 psig. the scrubbers take in the gas at about 1,050 psig. and remove condensate which passes directly to the

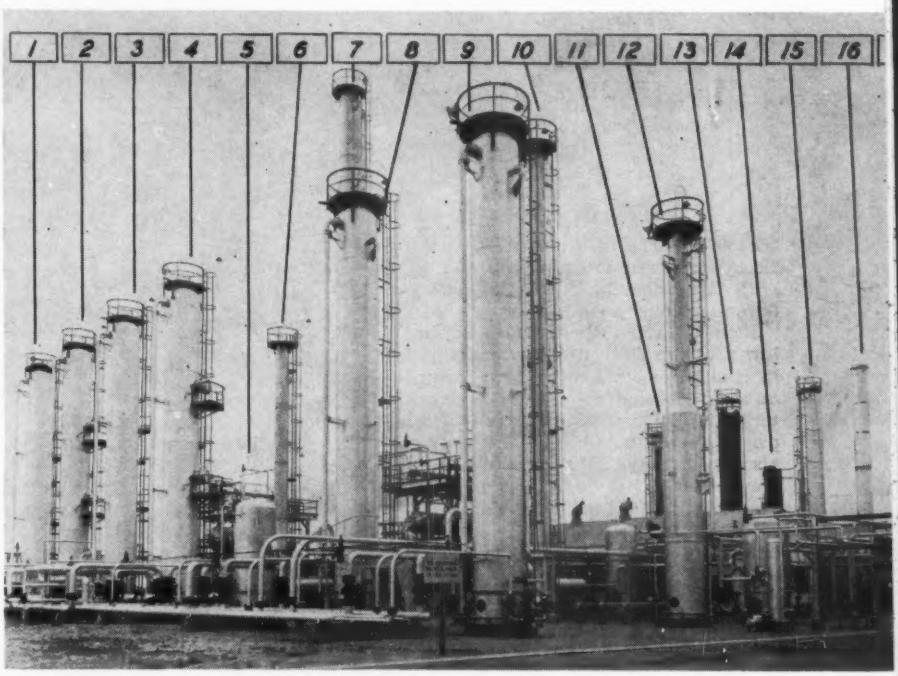
In goes 150,000,000 cu. ft. of gas per day . . . . .



condensate finishing unit. From the condenser-stripped gas 100 million cu. ft. goes to the absorbers to recover L.P.G. and natural-gasoline components, while the remainder goes to the low-pressure gas lines, as mentioned above. This condensate is dehydrated, is flashed in the high, intermediate, and low flash drums to remove methane and ethane, is depropanized in the hot flash tower, passes to the direct heater coils and thence to the condensate fractionating tower. Light motor fuel is taken overhead with naphtha, kerosene, and fuel oil taken off as side streams. Kerosene is used as absorption oil makeup, and a portion of the hot lean absorption oil is bypassed to join the feed to the condensate fractionator to recondition the oil. The condensate-stripped gas passes through a steam heater to raise the temperature to point where hydrate formation will not occur when pressure is reduced.

Since stripped gas is sent directly into the Carthage - Sterlington pipe line at 1,000 psig., the high-pressure absorbers operate at 1,050 psig., or 50 psi. lower than the well separator pressure and 50 psi. higher than the pipe-line pressure. This pressure differential will force the gas through the dehydrator and into the main gas line.

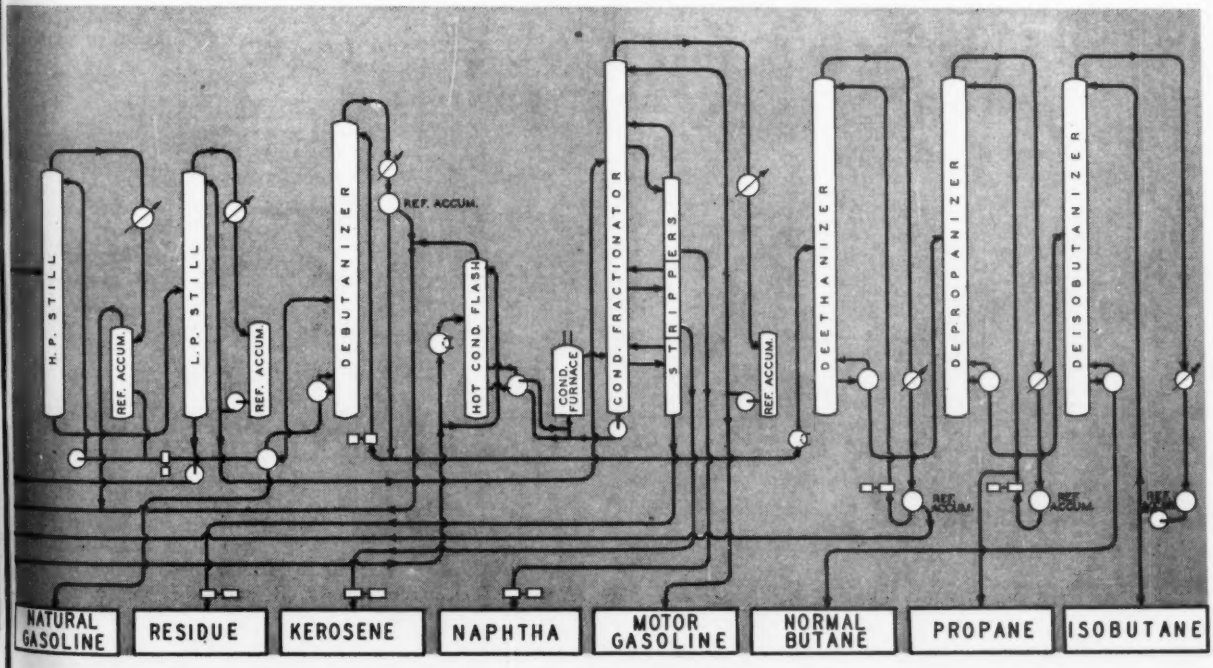
After contacting the gas in the absorbers, designed for 80 per cent butanes absorption, the absorption oil flows to the high, intermediate, and low flash drum and reabsorber as mentioned above. The upper section of the low-pressure flash drum is the reabsorber. Low-pressure flash drum and reabsorber is fitted with bubble trays and recycle gas from different accumulators is introduced into this vessel to pass countercurrent to the

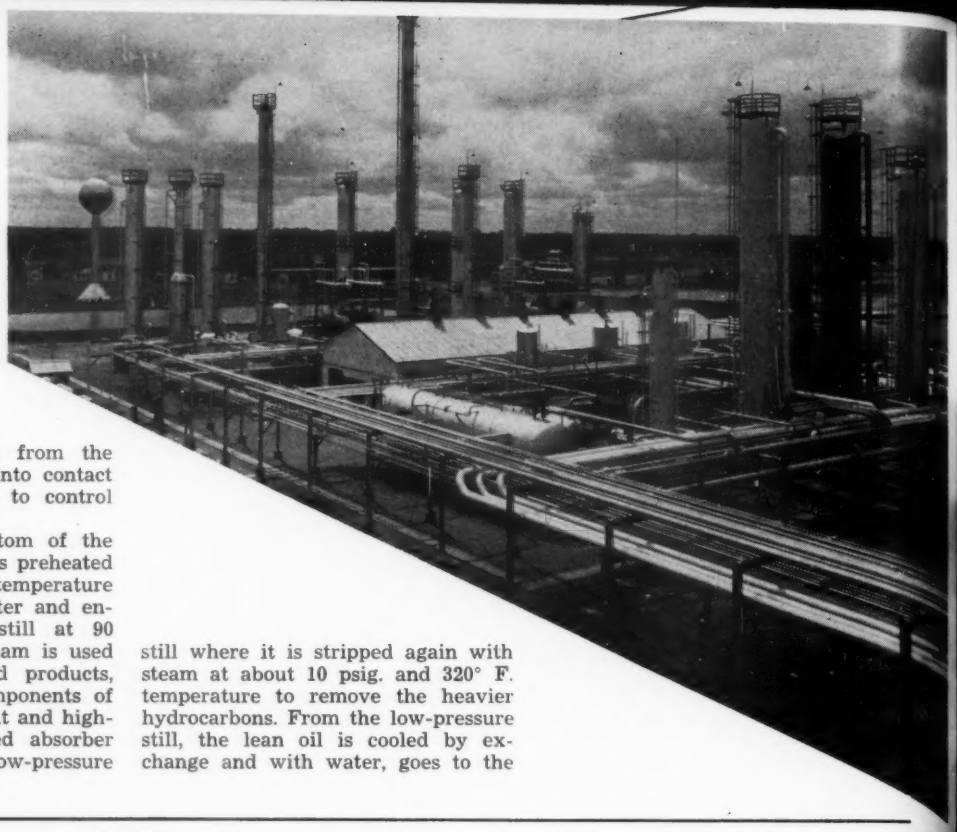


LEGEND

1, 2, 3, 4—Dehydration unit
5—Outlet scrubber
6—Deethanizer
7—Deisobutanizer
8, 9—Absorber
10—Depropanizer
11—High-pressure still
12—Reabsorber and low-pressure vent
13—Low-pressure still
14—Stripper
15—Condensate fractionator
16—Furnace stack
17—Hot condensate flash tower

Out comes three gas streams, and nine liquid products

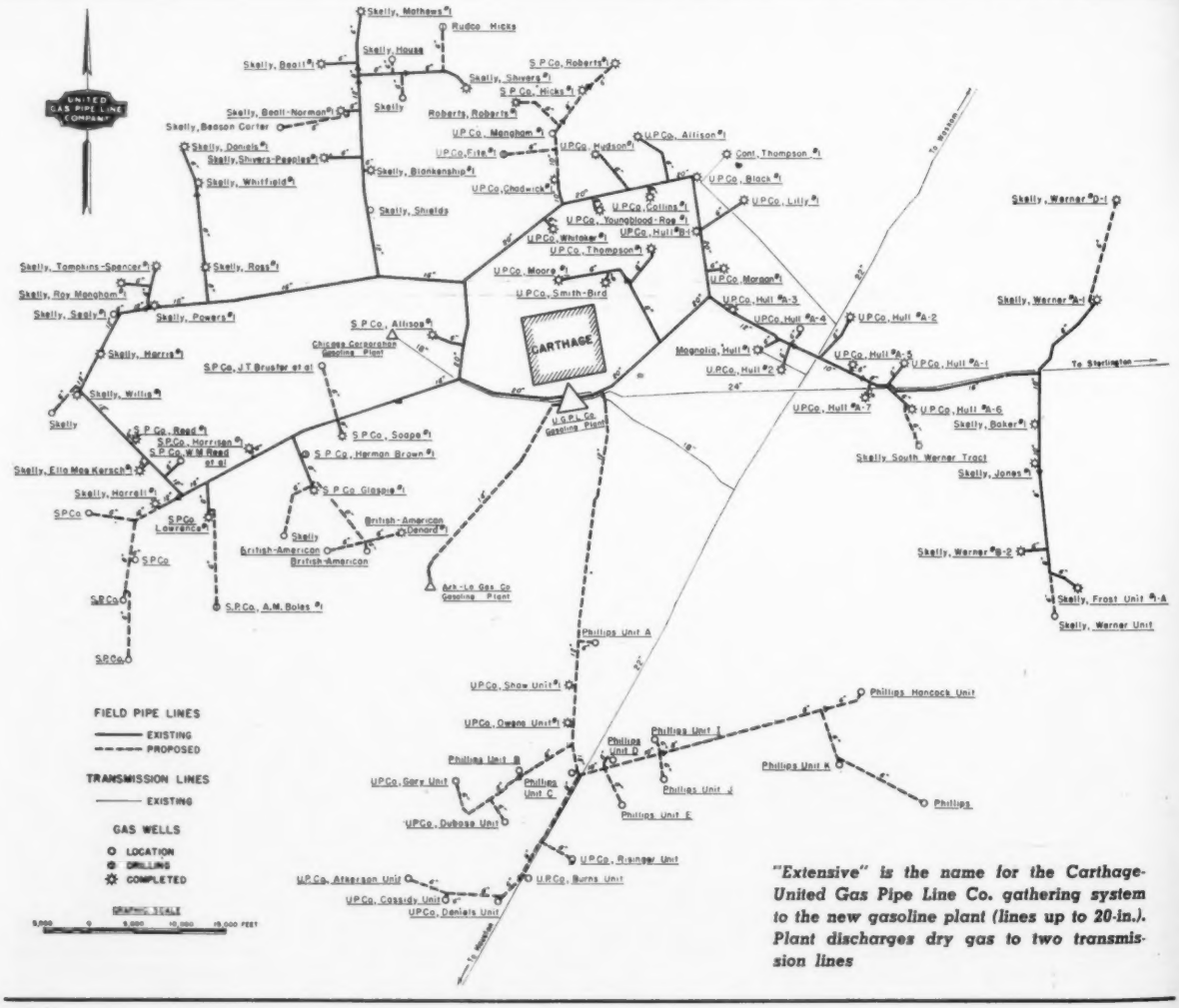




The Carthage plant is a model layout of absorbers, stills, fractionators, processing furnaces, and steam-generating equipment

flashed rich oil. Vapors from the flash drum are brought into contact with lean absorption oil to control butane recovery.

Rich oil from the bottom of the low-pressure flash drum is preheated in exchangers, raised to temperature in a direct-fired coil heater and enters the high-pressure still at 90 psig., where stripping steam is used also to remove absorbed products, down to the heavier components of 350° F. initial boiling point and higher. The partially stripped absorber oil passes then to the low-pressure still where it is stripped again with steam at about 10 psig. and 320° F. temperature to remove the heavier hydrocarbons. From the low-pressure still, the lean oil is cooled by exchange and with water, goes to the



"Extensive" is the name for the Carthage-United Gas Pipe Line Co. gathering system to the new gasoline plant (lines up to 20-in.). Plant discharges dry gas to two transmission lines

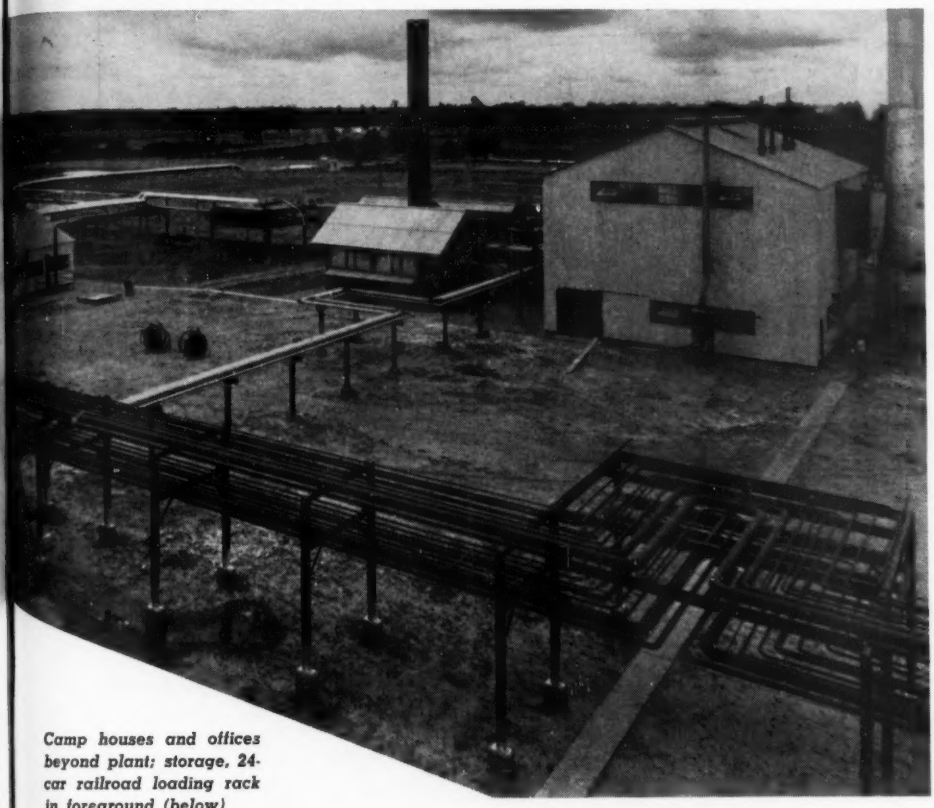
surge tank from which it is picked up by the oil pumps and sent to the high-pressure absorbers and the top of the reabsorber low-pressure flash drum to continue the cycle.

The raw recovery products from the high-pressure still is stripped of butanes and lighter in the debutanizer tower. Most of the overhead is condensed and is robbed of ethane in the deethanizer tower, the bottoms from which go to the depropanizer tower. Bottoms from this tower go to the deisobutanizer and are split into normal and isobutane fractions. Bottoms from the debutanizer are stored as natural gasoline, while the depropanizer overhead is used as L.P.G.

Dehydrating the Gas

The stripped gas is transferred to the dehydration plant which includes four dehydration towers, each 5 ft. diameter by 50 ft. in height. These towers are designed to treat 100,000,000 cu. ft. of gas at 1,200 psig., and are operated at 1,030 psig. As a desiccant these towers are packed with a specially treated bauxite containing 60-70 per cent of alumina (Al_2O_3). Parallel flow to two of these towers is maintained for 24 hours, and the flow is then diverted by manual control to the other two towers in which the desiccant alumina (bauxite) has been reactivated during that period. The spent desiccant is reactivated by passing hot dry gas at about 400° F. through the towers for about 8 hours. After this period, the reactivating gas is cooled and mixed with the gas entering the high-pressure pipe line. In this procedure the reactivated towers are permitted to remain idle for 12-16 hours after reactivation before wet gas is reintroduced into them for dehydration purposes.

Design and construction was by Stone & Webster Engineering Corp., R. M. Wood construction superintendent, and C. S. Hicks, project engineer. For United Gas Pipe Line Co., C. W. Hollenshead was engineer in charge of construction, with J. D. Hilburn resident engineer; R. G. Murray is superintendent of the plant, F. L. Rhoades is superintendent of gasoline plants, and A. H. Weil general superintendent.

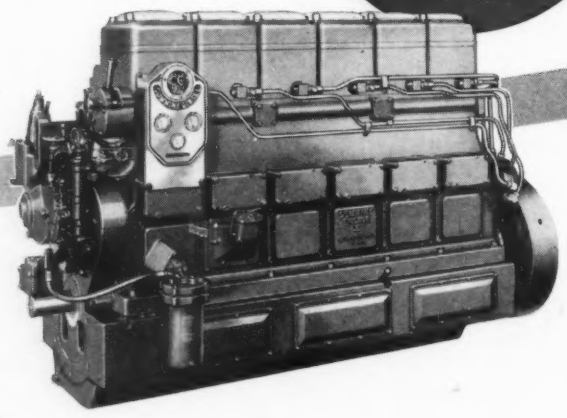


Camp houses and offices beyond plant; storage, 24-car railroad loading rack in foreground (below)

Value ahead of volume assures the finest

CUMMINS Dependable DIESELS

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS



CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Control of Gas-Cap Expansion

in North Coles Levee Pressure-Maintenance Report

by W. J. Travers, Jr.*

Pressure-maintenance work in a deep California field, including how a combination injection-production well was constructed, trouble with an expanding gas cap and the remedial work done—the article is from the program of the recent meeting, at Los Angeles, of the A.P.I. Pacific Coast district, division of production.

STRUCTURE of the North Coles Levee field is that of an elongated dome with an almost east-west trend. The apex is located in the northeast quarter of Section 32-30s-25e, M.D.B. &M. The field is about 18,500 ft. long and 9,000 ft. wide. Although there is no surface evidence of structure, folding is reflected in all beds below the Recent river fill. The discovery well was located after intensive work with reflection seismograph in the early part of 1938.

Sequence of Formations

Formations from the surface to 4,000 ft. consist of Recent, Tulare, and San Joaquin clay beds. Due to the absence of coring at shallow depths, stratigraphic boundaries for these formations have not been established. This Quaternary-Upper Pliocene interval is predominantly sand down to about 1,800 ft. and largely shale with a few lenticular sand lenses from 1,800 ft. to 4,000 ft.

From 4,000 ft. to about 7,000 ft., the formation is predominantly blue shale of Etchegoin-Pliocene age. There are a few lenticular sand bodies. Numerous normal faults are present in this interval. These faults seem to die out with depth and with one or two minor exceptions are unidentifiable below the base of the Etchegoin. In several localities some of these faults combined with otherwise favorable structure and discontinuity of the sand bodies, have resulted in the entrapment of dry gas. These dry gas sands range in depth from 4,000 to 5,600 ft. and have an aggregate areal extent of 400 acres.

From 7,000 ft. to a little below 9,000 ft., the formation consists of Upper Miocene beds of the Monterey series. This is the deepest penetration of any well drilled in North Coles Levee. The upper 800 to 1,000 ft. of Miocene consist of gray brown to brown shale with no sand bodies of any significance. These shales become increasingly compact and indurated with depth and are immediately underlain by an interval of about 200 ft. of very hard cherty brown shale which is known as the "chert zone." Near the top of this zone is an outstanding electric log marker known as the "N" point. It is the most consistent and widely used point for contouring in deep producing areas of the central part of the valley.

*Richfield Oil Corp.

Below the chert zone, lies a sandy series which has a total thickness of about 1,000 ft. A number of local names have been applied to this sand and to various subdivisions of it, but the whole interval is usually known as the "Stevens sand." Permeable sands in the North Coles Levee field first occur at points from 200 to 400 ft. below the top of the chert zone. The oil-saturated zone has a maximum of 850 ft., of which about 70 per cent is sand.

Varying Well Conditions Found

The North Coles Levee field was discovered by Richfield Oil Corp. with a completion on November 27, 1938, the well now designated as Coles Levee "A" 32-32. An initial production of 3,018 bbl. of 49.7° gravity oil per day and 18,000,000 cu. ft. of gas was obtained from the interval 8,406-8,677 ft. Gas-oil ratio was 6,000 cu. ft per barrel. As demonstrated by subsequent development, this producing interval included 160 ft. of the original gas cap and 110 ft. of oil producing sands below the original gas-oil interface.

The second well, Coles Levee "A" 52-32 located 950 ft. east of the discovery well, was completed on April 9, 1939, for an initial production of 1,984 bbl. of 48.4° gravity oil per day and 14,600,000 cu. ft. of gas. Gas-oil ratio was 7,400 cu. ft. per barrel. The producing interval in this well was from 8,534 to 8,792 ft. Shut-off point in the second well was 130 ft. lower stratigraphically than that in the discovery well, but was still high enough to permit entry of free gas from the gas-cap sands.

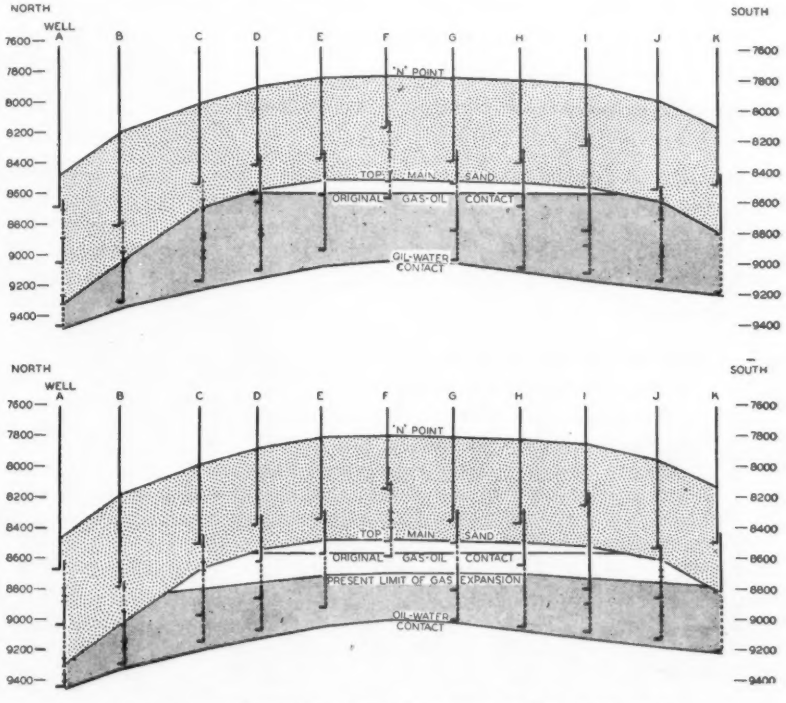


Fig. 1—(Top) Generalized North-South cross section, North Coles Levee field, showing original completions. Fig. 2—(Bottom) completions following remedial work. (Horizontal scale = 1½ vertical)

on the spot

BENDING

COLD QUICK ACCURATE

with the W-S Portable Pipe Bender

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The third well, Coles Levee "A" 12-33 located 3,600 ft. east of the discovery well, was drilled completely through the productive section. This well has the greatest stratigraphic penetration of any drilled to date. By continuous coring the oil-gas contact was located at 8,565 ft. and the oil-water contact at 9,150, 300 and 850 ft. respectively below the first permeable sand. From this well and information obtained from deep wells on nearby structures, it appears probable that there is little permeable sand for several thousand feet below the base of the "Stevens" sandy zone. This well was completed on November 23, 1939, for an initial production of 1,578 bbl. of 34.2° gravity oil and 1,293,000 cu. ft. of gas. The cementing point was selected sufficiently low to exclude the gas-cap sands. Top of this producing interval is about 200 ft. stratigraphically below the shutoff point in the discovery well. Completion of the third well with a gas-oil ratio of 800 cu. ft. per barrel definitely demonstrated the presence of low ratio black oil production within the pool.

Subsequent to this completion, wells within the areal extent of the original gas cap were cemented through perforations below the oil-gas interface and completed with uniformly low gas-oil ratios of 600 to 800 cu. ft. per barrel.

Water-String Shutoffs

In Fig. 1 the original conditions are shown on a north-south cross-section. The top line represents the "N" point marker. The first permeable sands come in irregularly from 200 to 400 ft. below the "N" point. The water string shutoffs are placed not at a stratigraphic point, but at the top of the first permeable sands. The second line on the section represents the base of a fairly continuous shale body and the top of the main producing sand. The interval from the shutoff point down to this shale body contains very little sand on the crest of the structure, but changes laterally to include some fairly good sand bodies on the flanks and on the eastern plunge. Production from these zones has generally been separated from that of the main zone by packers placed in cemented blank sections or by inclusion of only a single zone in a given well. This interval is known as the Upper Western zone. A very good development of the sand in the lower portion of this interval on the south flank of the structure is referred to as the "25-33" sand. A good development of the upper portion of this interval on the easterly plunge and north flank is known as the "21-1" zone. These designations both refer to the well in which the particular sand was first produced. The sand development below the next line in Fig. 1 is known as the Lower Western zone. It consists predominantly of permeable sands with a few relatively thin and apparently discontinuous shale bodies. These shale bodies are of very little value in correlation and are apparently so limited in areal extent that they have only a minor influence upon the vertical and horizontal movements of reservoir fluids. About 300 acres on the crest of the structure was originally occupied by gas cap. There is no faulting of magnitude sufficient to be discernible from electric log correlations, or from cores, below the top of the chert zone. Behavior of reservoir fluids, however, suggests that a permeability barrier of some type trending N 60° E across the south portion of Section 29-30s-25e exists. This barrier may be the partial result of a fault of small displacement.

Sand permeabilities throughout the Upper and Lower Western zones vary through a wide range from 0 to 7,500 md., but average a little above 100 md.

Following the completion of the third well, a rapid development program was instituted. A total of 69 wells were completed by the end of 1941. Since that time, development has proceeded at a slower rate. To date, 72 wells have been completed in the Lower Western zone, 4 wells have been completed in the Upper Western (25-33 zone) and 21 wells have been completed in the 21-1 zone. These wells have required a drilling time which has averaged 60 days. The casing program has consisted of a surface string of 11¾ or 13⅜ in. casing cemented at 1,400 ft., a water string of 8⅝ or 7 in. casing cemented through the chert zone at the top of the first permeable sand at depths ranging from 8,300 to 9,000 ft., and a 6⅝ or 5½ in. liner. The drilling time is divided into three roughly equal intervals. The first 20 days are required to drill from the surface to 8,000 ft. or just above the chert zone. The second 20 days are required to drill through the chert zone. In the hardest part of this interval, rock bits frequently make as little as 5 ft. The third 20 days are required for running, cementing, landing, and testing the water string, drilling into the zone, running and cementing the liner and completion operations. The average over-all cost of the completed wells is about $100,000.

It is from the Lower Western zone that the principal withdrawal has occurred and it is this zone which has been selected for the principal effort in pressure maintenance.

In the initial condition sands in the interval from the top of the Lower Western zone to the oil-gas contact contained free gas and condensate. The interval from this contact down to the top of the bottom water initially contained 34° gravity oil with solution gas at a formation ratio of 600 cu. ft. per barrel.

Pressure Maintenance Operation Selected

During the period of rapid development, no information was available as to the rate of gas expansion or possible edge water encroachment. The producing interval of the Lower Western zone wells included the sands from a short distance below the oil-gas interface to a point 20 to 50 ft. above the oil-water contact. During the first 4 years, the field was producing in the conventional manner. Allocation of the pool allotment to individual wells was such as to maintain a relatively even pressure pattern. This close pressure control minimized the possibility of gas coning into a pressure low. Reservoir pressures showed a slow and wholly normal decline. There was no evidence of edge water encroachment. The initial high ratio wells were shut-in to conserve reservoir energy. After a sufficient number of wells had been completed to determine the reservoir

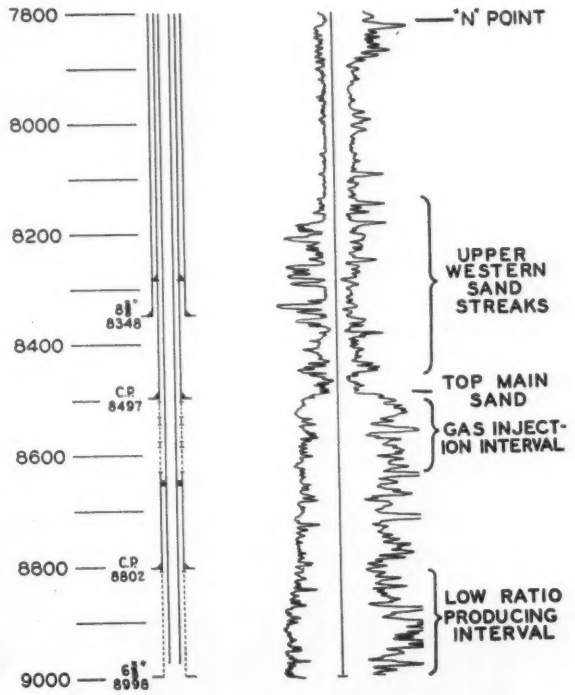

Fig. 3—North Coles Levee field typical electric log, showing combination gas-injection and producing well

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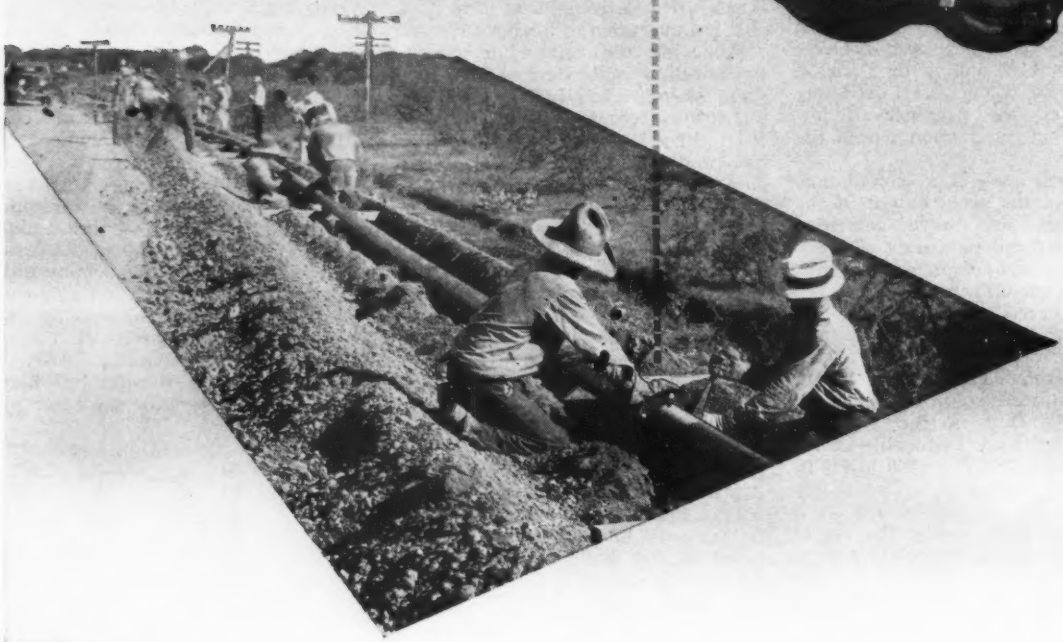

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characteristics, an intensive study was made to select the most advantageous method of exploiting this relatively deep and high pressure, low permeability reservoir. No pressure maintenance experience was available from any California fields, but the results of such operations in the Gulf Coast area indicated the desirability of such a plan. Disappointing results from the later stages of production operations of similar California fields such as North Belridge and Kettleman Hills was another important influence.

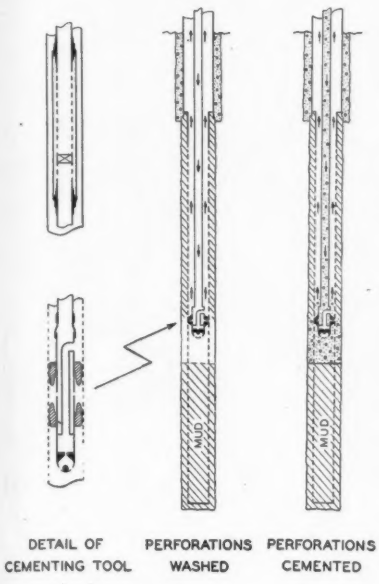


Fig. 4

The 3,600-hp. compressor plant was completed and the first gas was injected on November 19, 1942. By January 1, 1943, sufficient gas was being injected to maintain pressures and complete pressure maintenance has been adhered to since that time. The dry gas zones in the Etchegoin formation have been partially developed and have been drawn upon for make-up gas to supplement residue dry gas from the absorption plant. Injection rates have varied from 20 and 35 million cu. ft. per day at pressure of 3,200 to 3,400 psi. The results observed to date have been most encouraging. The flowing life of the wells has been prolonged. The pattern and rate of gas cap expansion has been favorable.

Expansion of the gas cap was noted early in the producing life of the field. At the present time gas has expanded to a position represented by the lower line in Fig. 2. Remedial work has been performed to lower the top of the producing interval. There is still no discernible movement of the bottom water. Gas is currently being injected at a surface pressure of 3,300 psi. into five injection wells. The injection interval is confined to the top 150 ft. of the Lower Western zone. Four of these wells are used exclusively for gas injection and one is a combination injection and producing well. In the straight injection wells, gas is injected through the 2½ in. tubing. In the combination well, gas is injected in the annulus between the 2½ in. tubing and a 6⅝ in. protective string while the well is produced through the 2½ in. tubing.

The completion of the combination injection and producing well is illustrated in Fig. 3. An 8⅝-in. water string is cemented above the first permeable sand streak. A 6⅝-in. liner is perforated through the upper 130 ft. of Lower Western zone and cemented from that point back to the shutoff. Another cemented blank section is provided from the bottom of the injection zone to a point about 200 ft. above the bottom of the producing zone. The bottom 200 ft. is the producing interval. A 6⅝-in. protective string was run and cemented just above the top of the liner. This string serves the dual purpose of preventing leaks through or possible failure of the 8⅝-in. water string and permitting the running of a conventional packer to separate the injection and producing zones. The annulus between the 6⅝ and 8⅝-in. casing was left full of mud and the 8⅝-in. casing side outlets are left open so that any leakage of gas can be quickly detected. Electric log of this well shown to the right of the mechanical details is

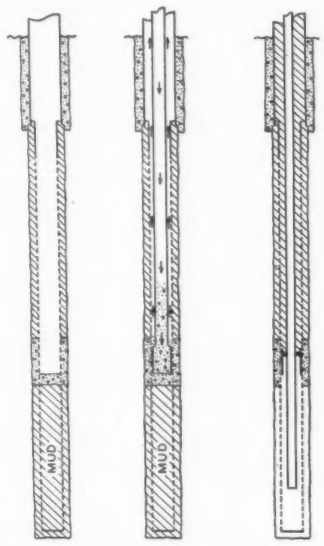
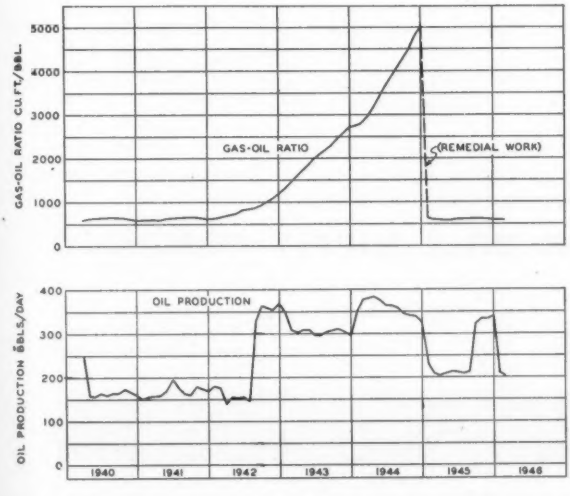


Fig. 5

(Continued on page 105)



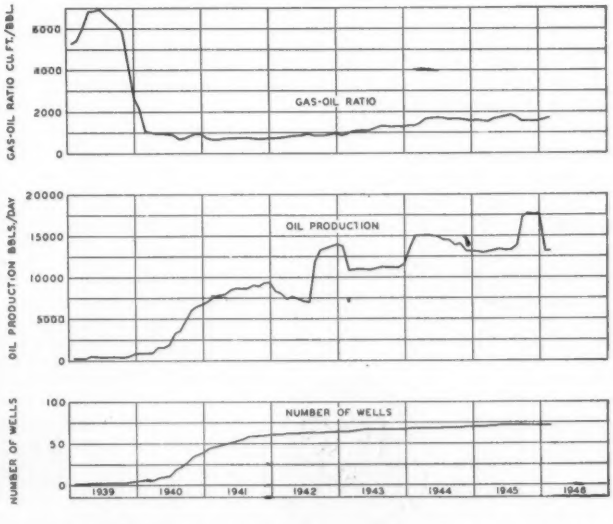
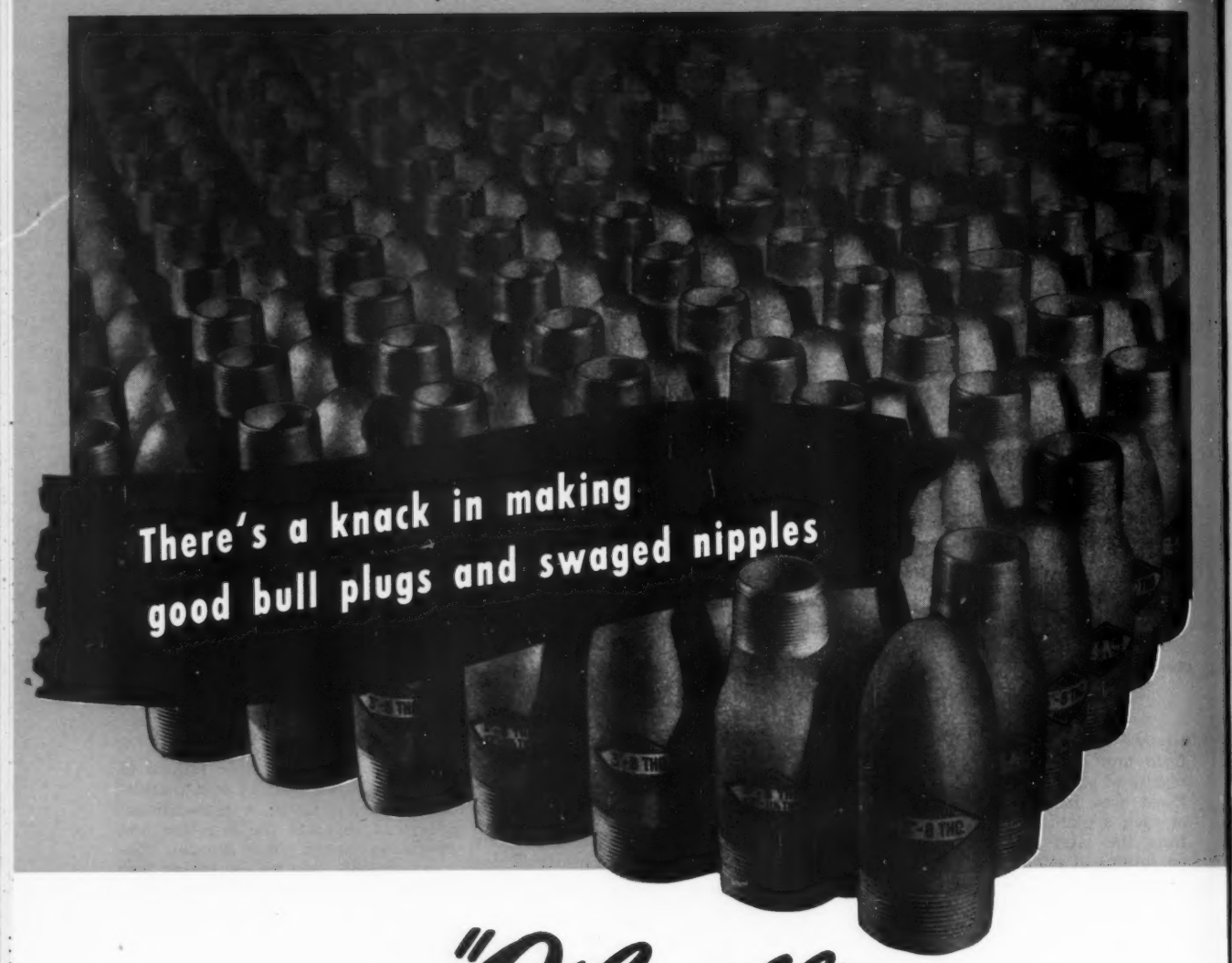


Fig. 6—(Left) Well-performance curves on typical well in North Coles Levee field. Fig. 7—(Right) Reservoir-performance curves, western zone, North Coles Levee field



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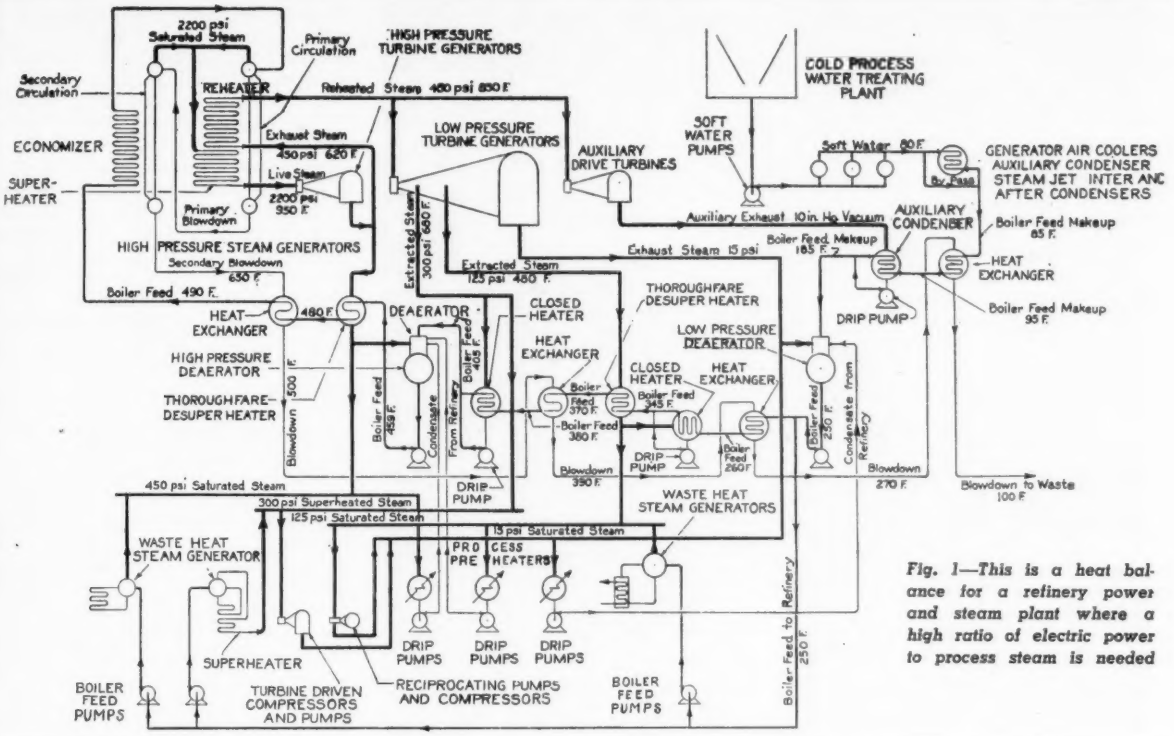

Fig. 1—This is a heat balance for a refinery power and steam plant where a high ratio of electric power to process steam is needed

DESIGN AND COST FACTORS

. . . for Steam and Power Generation in the American Refinery

by William F. Ryan

A HYPOTHETICAL heat balance for a large refinery requiring large quantities of steam for process and a high ratio of electric power to process steam, say 120 to 125 kw.hr. per thousand pounds of steam is shown in Fig. 1. This is by no means inconceivable in the case of a large refinery with attendant chemical-manufacturing operations.

An operating pressure of 2,200 psi. is selected not because it is the maximum which should be considered, but because it is the maximum now commercially developed and in operation in existing power plants. One of these is a public-utility power plant in which the boiler feed is 100 per cent condensate.[1] The other is an industrial plant in which the feed water is 100 per cent treated makeup except for the steam condensed in the feed-heating cycle.[2] The raw water for the latter is comparatively good, being taken from Lake Erie, but it is significant that this boiler installation, equal in pressure to the highest used for power generation in the United States, has been successfully operated on chemically treated water. In spite of the cost of the treating plant and the greater cost of the boiler which has to be designed for much lower rates of heat transfer than if pure condensate were used for feed, the gain in yield of byproduct power was probably ample to carry the excess investment over the cost of an evaporator-condenser for supplying process steam. Besides, there is something to be said in favor of designing a boiler for treated-water conditions.

"Objective of a refinery power plant is to achieve a high yield of electric power from the amount of process steam which the process consumes." That is the background theme in this concluding article, as well as those which appeared in the June 29, July 6, and July 13 issues—concurrent with the treatment of specific engineering factors and equipment designed to meet the above basic objective.

A degree of conservatism is imposed upon the designer which may be beneficial to the over-all service factor, in commercial operation.

The proposed throttle temperature of 950° F. is also established commercial practice. One public utility has experimented with steam at 1,000° F., and another is now contemplating a 1,050° F. installation, but 950° F. probably represents the highest temperature commercially demonstrated for power generation with high-pressure steam. The live steam at 2,200 psi. and 950° F. would be passed through a high-back-pressure turbine, exhausting at 450 psi., and generating approximately 40 kw.hr. from each thousand pounds of steam. Use of steam at this pressure for feed water heating would materially extend the yield of byproduct power.

The 450-psi. steam withdrawn from the power cycle for feed-water heating and refinery use would first be

*Stone & Webster Engineering Corp.

Fig. 2—Compact, efficiently arranged chemical storage for refinery water-treating plant

desuperheated in a thoroughfare-type desuperheater, the device previously mentioned as having been used at Louisiana station with beneficial effect on the power yield. On the other hand, 450-psi. steam retained in the power cycle would first be reheated to 850° F., before being delivered to the low-pressure turbine generators and auxiliary drive turbines. Thermodynamically, it would pay to reheat to a higher temperature, but 850° F. is believed to be the highest temperature used commercially with turbines designed for this pressure, and to have both the primary superheater and reheater designed for 950° F. would require excessive use of radiant-heat superheating surface.

The low-pressure turbine generators would be designed with controlled extraction at 300, 125, and 15 psi., corresponding to the pressures generated and used in the process refinery equipment. The 125-psi. steam would be desuperheated before delivery to the refinery, but the 300-psi. steam would not be desuperheated because steam would be generally used at that pressure for turbine drives throughout the refinery and the residual superheat would be highly beneficial. Steam at 300 psi., generated in process equipment, would also be superheated.

The proposed reheat has been conventional practice in many central stations since 1925. Steam at 2,200 psi., 950° F. might conceivably be used in a high-back-pressure industrial plant, without reheat, but the advantage of reheat in this instance is great, since it affords a major increase in the yield of byproduct power.

The thesis that throttle temperature should be high, in this case the temperature at the throttle of the 450-psi. turbine, has been ably demonstrated by Cross and Wells of General Electric Co.[3] This results in extraction of process steam at higher than the required temperature and permits the interposition of thoroughfare desuperheating heaters. In the example used by Cross and Wells, byproduct power yield was increased 35 per cent by raising the throttle temperature of a 650-psi. turbine, exhausting at 150 psi., from 600° to 850° F. The increase in yield from the proposed 450-psi. unit in this hypothetical heat balance would be even greater because of the greater residual superheat at the several points of extraction.

Heat exchangers, rather than flash tanks, are used for extraction of heat from the boiler blowdown. Auxiliaries exhaust at a variety of pressures, thus affording the equivalent of a regenerative cycle, without an excessive number of extractions from the main turbines.

Another device which has been thoroughly developed commercially, is the location of such heat exchangers between stages of the boiler feed pumps. In this way, the thoroughfare desuperheating heater and the blowdown heat exchanger can be designed for less than 800 psi. working pressure, although the feed discharge pressure would be in the neighborhood of 2,500 psi.

Condensate is a precious material in a high-pressure boiler plant. Therefore, our hypothetical heat balance proposes returning condensate to the power plant from all closed heat exchangers in the refinery. Due precautions must be taken to avoid contamination, and this again requires attention to details in the refinery. Moreover, it is proposed to recover the condensate at full process temperature to avoid the losses involved in flashing the water before it is returned.

The boiler shown has a double circulating system designed to reduce the handicap of high blowdown normally encountered in the refinery power plant. Treated water is fed to the primary circuit which includes the furnace tubes and all other tubes exposed to direct radiation. This circuit is continuously blown down into a secondary system, which includes the convection surface where heat-transfer rates are less and higher concentration of solids in the feed water is not hazardous. Here the concentrated feed is subjected to further evaporation. The final blowdown is from the secondary circuit and is obviously materially less than would be required from a single circuit to maintain the low concentration desirable in the most active parts of the circulating system.

Cost of Heavy Blowdown

Heavy blowdown is costly in several ways. Most of the heat may be recovered in heat exchangers, flash tanks, and otherwise, but there is inevitably some loss of heat and there is a degradation of energy involved which is more important when water at elevated pressure and temperature is reduced to atmospheric conditions without performing any useful work. Probably the most serious penalty of heavy blowdown is the cost of treating the water used to replace, but the additional investment required to pump the extra water, and to provide for preheating it and circulating it in the boiler, is also a factor of some importance.

It can be readily agreed that the hypothetical plant here described involves complications beyond the range of present-day installations, but except for the dual-circulation boiler, it involves no single element which is not in continuous and successful operation today. The dual-circulation boiler is now being installed in two refineries, and in any event this is but a minor feature of the hypothetical design. Granting the relative complication, do refinery operators yield to those in any other industry with respect to operating ability? It is

agreed that the proposed steam pressure is too high to be considered in some localities, on account of the water-treating problem and the magnitude of the blowdown which would be required, even if successful treatment could be achieved. In some locations, it would be necessary to accept the penalty of evaporator condensers to supply steam at the several pressures. In other localities, however, treatment is feasible, as has been demonstrated on the shores of Lake Erie. While the high pressure undoubtedly aggravates the problem of feed-water treatment, will the refinery chemists concede any superiority to those of other industries? The hypothetical plant presents a challenge to the designer and operator alike, but it would accomplish four things:

1. It would yield more than 100 kw.hr. per 1,000 lb. of process steam.
2. It would produce this yield at a heat consumption of not more than 4,500 B.t.u. per kw.hr.
3. It would provide this high yield of cheap power at a capital cost of less than $125 per kw. over and above the cost of a low-pressure boiler plant supplying only process steam.
4. It would provide a point of departure from which genuine advances in the art could spring, such advances as higher pressures of the order 3,000 to 3,200 psi., higher temperatures, new thermodynamic devices for increasing yield and the like. Advances in these directions would be of too little advantage to a public utility to warrant the cost of development, but would pay golden dividends to the petroleum refiner.

Cost of Refinery Power-Generating Plants

A survey of 85 plants of this type[4] has shown that the average prewar capital cost of power-generating equipment was about $105 per kw. In general, the unit investment decreased with increasing steam pressure. For example, a plant properly designed to generate 1,000 kw. from 100,000 lb. per hour of process steam would cost about $130,000 more than a low-pressure boiler plant designed to produce process steam only. To increase the yield to 2,000 kw. would require a higher operating pressure, and the higher-pressure boilers, piping, and feed pumps would cost more in total, but not more per kilowatt. A plant to produce 2,000 kw. from 100,000 lb. per hour of process steam would cost about $220,000 more than a low-pressure boiler plant to produce that quantity of process steam or about $110 per kw. Construction costs are now materially higher, but for large plants, 10,000 to 50,000 kw., $125 per kw. is probably an outside figure for the cost of power generating equipment over and above equipment for steam generation at process pressure only.

In contrast, the average American public utility including public power authorities, has an investment of more than $300 per kw. in electric plant alone, exclusive of working capital, offices, shops, and other capital items essential to its business. This, of course, includes transmission and distribution as well as generating plant, and includes the delivery of power to domestic as well as industrial consumers. Nevertheless, electric-plant investment required for the delivery of power to the largest consumers, such as refineries, is seldom less than $175 per kw. TVA's electric-plant investment is about $187 per kw. of plant capacity, in spite of the large share of the capital cost of "multipurpose dams" allocated to flood control and navigation. The capital cost for serving large industrial plants probably averages in the neighborhood of $200 per kw. This high capital cost, together with the higher unit fuel consumption in condensing central stations, is a severe handicap to the public utilities in competing for refinery business. The fact that they are frequently able to supply power at an attractive rate is due in part to lower unit costs of labor and maintenance, which the great volume of their production makes possible, but it is due chiefly to the low return on their investments to which they are restricted by public regulation. If public utilities expected their investments to "pay out" in 5 years, as many refiners do, they could not afford to supply power at present rates.

The low return on public-utility investment is theoretically justified by the stability of the business. Continuous advances in the art of refining have made it necessary to provide for a higher rate of depreciation and obsolescence on process equipment. These advances, however, have shown no tendency to eliminate, or even to reduce, the demand for electric power. Accordingly, a somewhat different attitude may be justified with respect to investments in power-generating equipment, and if the refiner would be content with a payout in 10 to 12 years, instead of 3 to 5, the construction of private generating facilities would usually yield an attractive return. Moreover, if the installation of power-generating equipment will pay on any basis, it will certainly pay to design the plant intelligently, for an adequate yield of byproduct power.

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1. Twin Branch plant of American Gas & Electric Co., Twin Branch, Ohio.
2. Painesville, Ohio, plant of Diamond Alkali Co.
3. "An Improved System in the Application of Noncondensing or Extraction Turbines." Transactions, A.S.M.E., 1940.
4. See "Progress of High Pressures in the Industrial Plant," Mechanical Engineering, June 1940.

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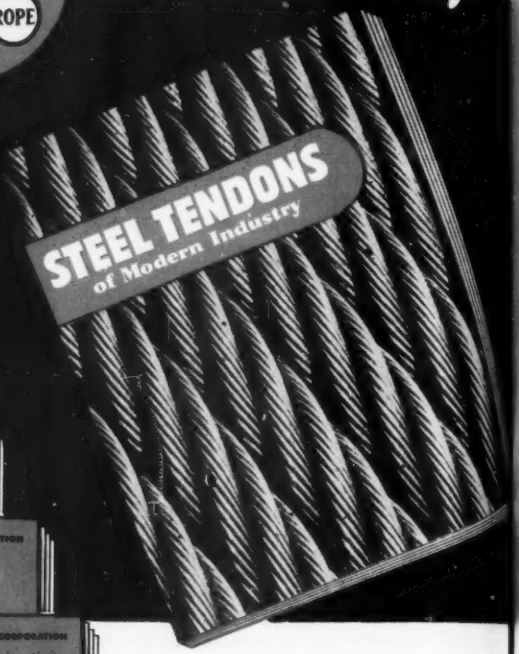

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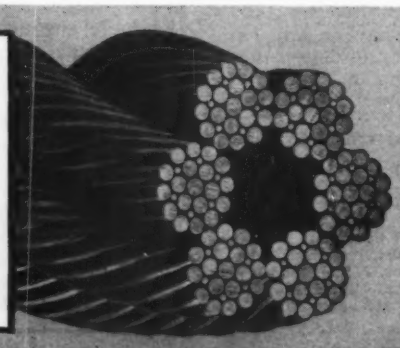

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THE ULTIMATE IN LOW COST WIRE ROPE

Control of Gas-Cap Expansion

(Continued from page 95)

typical of wells drilled in the gas cap area of the structure.

Excluding the two initial wells, the expansion of gas cap first appeared in Coles Levee "A" 38-28 in February 1941. The second and third wells to be reached by expansion of the gas was Coles Levee "A" 18-29 and Coles Levee "A" 32-33, both in July 1941. The increase in ratio was slight at first. After February 1942, a marked tendency towards increased ratios was apparent.

Remedial Work for Gas-Oil Ratio Control

The first method of gas-oil-ratio control consisted of shutting in wells where ratios had climbed above 2,000 cu. ft. per barrel. By April 1942, six wells were shut in for this reason. It was then apparent that some means of gas-oil-ratio control which would avoid the loss of producing wells would be necessary to efficiently carry out the objectives of pressure maintenance.

When the original liners were run, blank sections 20 to 40 ft. long were provided opposite shale bodies with the thought that these might be cemented at a later date and utilized for the setting of packers for gas-oil-ratio control. A program was instituted early in 1943 to follow out this plan. The procedure was as follows:

A bridge was placed just below the section to be cemented. Cement was pumped behind the blank interval through a cement retainer run on tubing and set in the blank section. Cement was then cleaned out inside the liner and the effectiveness of the blank section cement job was tested with a formation tester. Sufficient tubing or drill pipe was run dry to produce a hydrostatic differential of about 2,000 psi. when the tool was open. If the test showed no leak, a surface pressure of 1,500 psi. was applied to the annulus making a total differential of 3,500 psi. One or more cement jobs were usually necessary. Remedial work on eight wells were performed in this manner. A total of 16 cementing operations was required to produce effective jobs, an average of two cementing jobs per well. The cost of this type of remedial work varied from $13,000 to $27,000 per well, averaging $19,500.

This method was on the whole satisfactory in wells where we were fortunate enough to have placed blank sections in the proper intervals. As expansion of the gas cap continued, wells were encountered which had not been provided with properly placed blank sections. In four of these instances, the old liners were pulled from the wells and new ones were

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P-9

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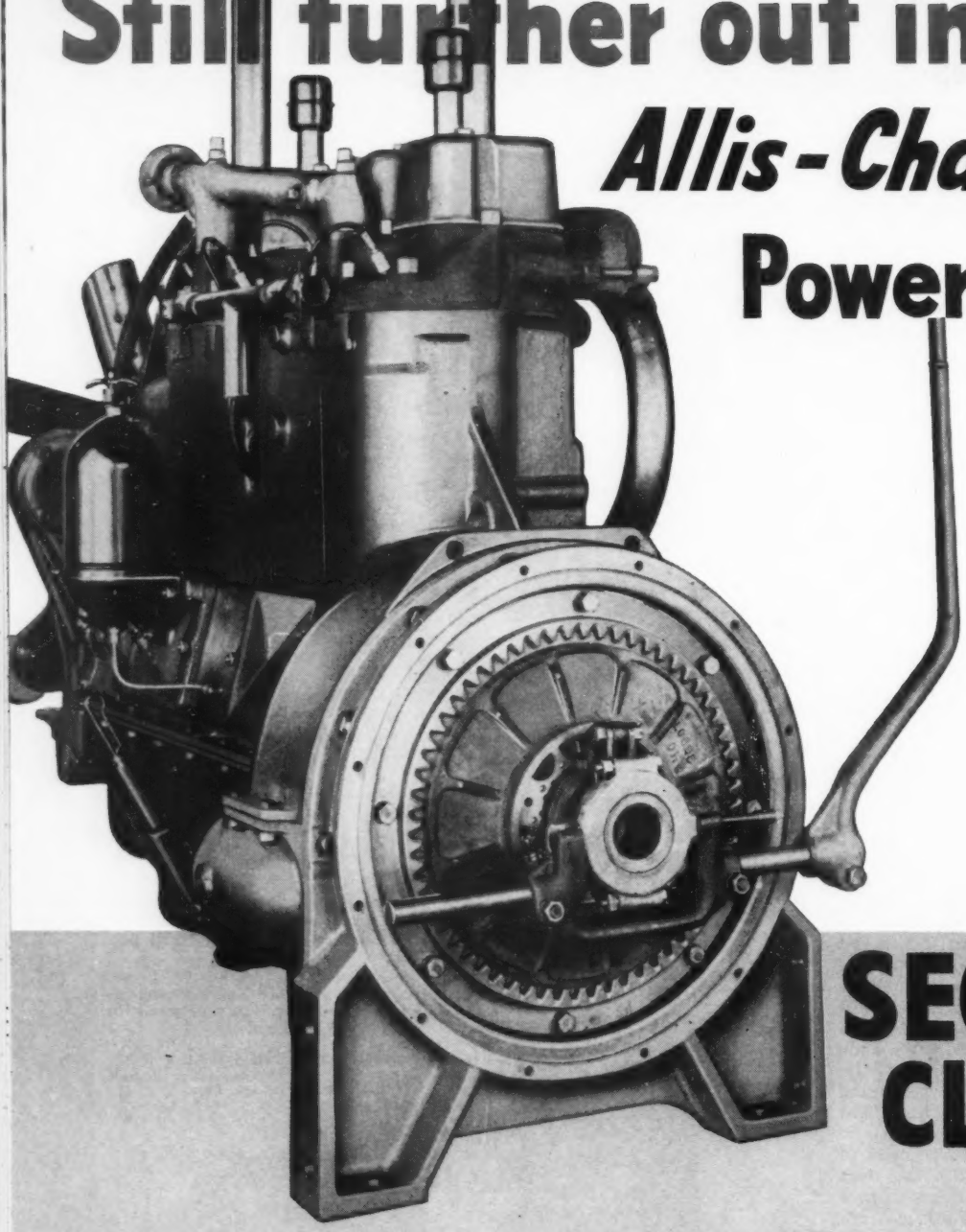

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run equipped for cementing at the proper points. The procedure in this type of work was as follows:

The perforations were first thoroughly washed with a bentonitic mud. Reservoir pressures would not permit the use of oil as a circulating fluid. Hydrochloric acid or mud acid was then used to attempt to dissolve the mud cake behind the liners. The liners were then cut in sections varying from 20 to 100 ft. in length and removed. Several hours of jarring was frequently necessary to loosen the pieces. In a number of instances, oil was spotted behind the fish to aid in the recovery.

After the liner was removed, the hole was underreamed and a new liner run, equipped for cementing at a point substantially below the bottom of the expanded gas cap. The average cost of the four remedial operations performed in the above manner was $68,000 per well. This cost was excessive and was largely due to the difficulty experienced in fishing. Due to this experience the desirability of developing a method for effecting a cement job in a perforated interval without removing the liner was developed.

Washing and Cementing Tool

A perforation washing and cementing tool was designed as shown in Fig. 4. The top portion of the tool consists of a bypass collar which is run in the string at the point of equalization of the cement. This collar consists of a perforated tubing nipple enclosed by a sleeve of slightly larger diameter. A baffle is placed in the perforated interval. This arrangement permits the use of rubber plugs in front of and behind the cement slurry to prevent contamination of the cement by the circulating fluid. Prevention of contamination is very important where small batches of cement are used for relatively deep cementing jobs. The theory of turbulent flow plus our experience indicates that in a 9,000-ft. hole, the first 15 or 20 sacks and the last 15 or 20 sacks of a batch of cement will be markedly contaminated by the drilling mud if cement is not isolated. Where batches as small as 50 sacks are used, very little uncontaminated cement is left by the time the cement reaches the intended point.

The lower part of the tool consists of a tubing mandrel with opposed swabs mounted as indicated. The fluid circulated down the tubing string is forced out through perforations in the liner through a hole in the mandrel between the swab rubbers. A bypass is provided to prevent a swabbing action when the tool is pulled from the hole. This is necessary to prevent disturbance of the cement after it has been pumped into place. The bypass is equipped at the bottom with a float type back check valve to prevent the cement from traveling downward and up through the bypass.

The well is first killed with water. The water is then changed to a rather viscous bentonitic mud and the interval to be cemented is thoroughly washed. The tool is then lowered to the bottom of the interval to be cemented and the mud is replaced with water above that point. The mud left in the bottom part of the hole has proved to be very effective in preventing the settling of cement below the desired point. The cement slurry is then mixed and pumped in the tubing.

When this slurry starts out through the liner perforations, the tool is slowly raised over the interval to be cemented. Circulating velocity is maintained at a high rate. This movement of the tool is coordinated with the displacing operation so that the tool arrives at the top of the interval to be cemented when the cement reaches the point of equalization. No further circulating is done and the cementing tool is pulled from the hole.

After the cement has been allowed to set, a bit is run in and circulating fluid is changed back to mud. The cement is then drilled out to a point about 10 ft. above the bottom of the bridge as shown in Fig. 5. A very close-fitting blank sleeve is then run, landed on the 10-ft. bridge remaining

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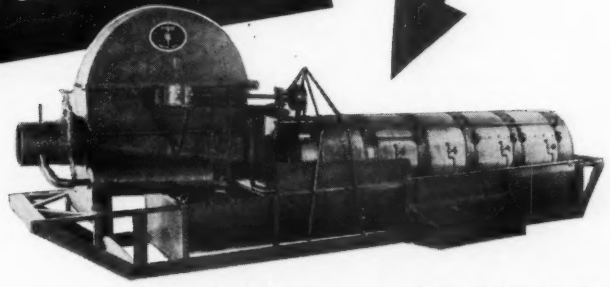

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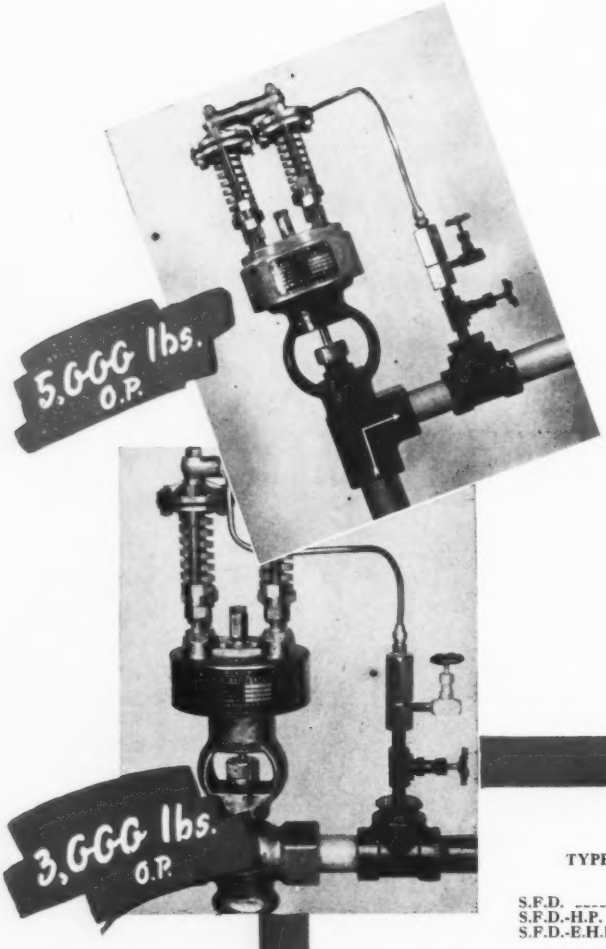

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OPERATING DATA

TYPE	Test Pressure	Maximum Operating Inlet Pressure	Controlled Discharge Pressure Max.	Min.
S.F.D.	6000 lbs.	3000 lbs.	650 lbs.	100 lbs.
S.F.D.-H.P.	6000 lbs.	3000 lbs.	1000 lbs.	100 lbs.
S.F.D.-E.H.P.	10,000 lbs.	5000 lbs.	1000 lbs.	100 lbs.

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and cemented through tubing with a thin cement slurry. In 6⅝-in. liners, a 5½-in. o.d. Grade "A" steel sleeve has been used. The use of relatively soft Grade "A" steel will permit the removal of the cemented sleeve if necessary by a comparatively simple milling job. The hole is then cleaned out to bottom and the tubing is run, equipped with a conventional hookwall packer which is set in the blank sleeve. After testing the packer, the sleeve, and the cement job simultaneously with pressure applied to the casing annulus the well is swabbed in and recompleted with the upper part of the former zone excluded. The annulus between the tubing and casing is left full of bentonitic mud and the casing side outlets are left open. Observation of the fluid level in the annulus will then quickly determine if a leak is occurring around the packer or sleeve and any gas leaks may be noted.

Four remedial jobs have been performed in this manner. Three of these operations were successful on the first attempt. In the other instance, it is probable that the sleeve was cemented opposite a section of side tracked hole which had not been accurately logged. In this instance, the sleeve was milled up in 36 hours with two mills and another sleeve was cemented at a lower point. This second attempt was successful. The average cost of the above remedial operation has been slightly under $20,000 per well. The procedure described has made possible the securing of a zone separating cement job in a perforated interval for approximately the same cost as cementing a blank section.

A production curve of a typical well located at the edge of the original gas cap is shown in Fig. 6. The oil production of this well through a 6-year period has varied from 140 to 385 bbl. per day. The gas-oil ratio was initially 600 cu. ft. per barrel. This ratio was maintained practically level until the early part of 1942 when a slight tendency to increase was noted. The gas-oil ratio climbed slowly at first and then more rapidly until a peak of 5,000 cu. ft. per barrel was reached at the end of 1944. A remedial operation was then performed and the production interval of the well was restricted to the bottom 200 ft. of the Lower Western zone. The ratio dropped sharply and has subsequently remained practically constant again at 600 cu. ft. per barrel. In all, 16 remedial operations have been performed. In every case, the ratio has been reduced from a high point of 2,000 to 5,000 cu. ft. per barrel to about the formation ratio of the black oil.

The combined effect of gas injection and remedial operations described are shown in Fig. 7. The lower curve depicts the number of wells completed in the Lower Western zone. Commencing with one well in the early part of 1939, development progressed rapidly during 1940 and the early part of 1941 and more slowly thereafter. At the present time, 72 wells are completed in the zone, including the five injection wells. The average oil production of the pool is represented by the next curve. Rates varying from 10,000 to 17,500 bbl. per day have been maintained for the past 4 years. The top curve represents the pool gas-oil ratio. This was very high for the initial wells but dropped sharply with the completion of low ratio wells and the shutting in of the two initial wells. The ratio was then fairly constant for 3 years and did not rise above 1,000 cu. ft. per barrel until the early part of 1943. Up to the present time, the increase is still gradual and the ratio is still below 1,800 cu. ft. per barrel. It is the purpose of the pressure-maintenance program to maintain this slowly rising trend until the gas has replaced a very large portion of the oil in the reservoir.

This plan will require many years of close control and a program of remedial operations for its accomplishment, but we are encouraged to believe that the results will more than justify the cost and effort.

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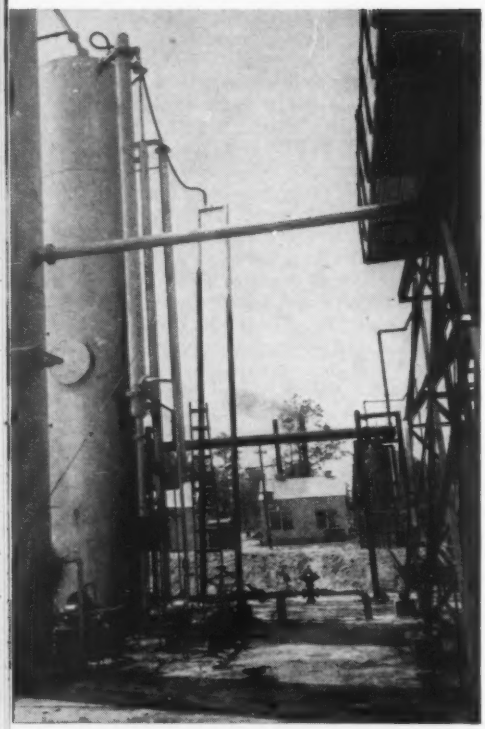


Low-Gravity Crude Oil Successfully Treated by Central Steam Heating

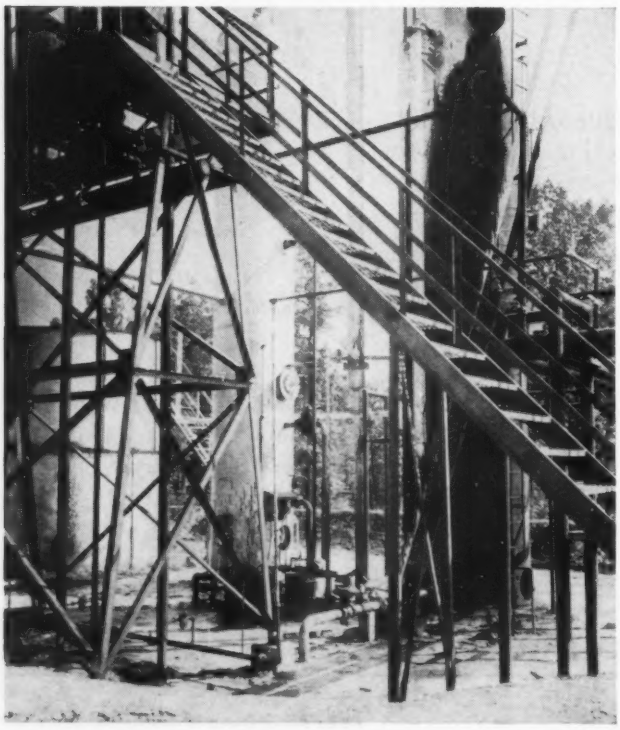
by Neil Williams

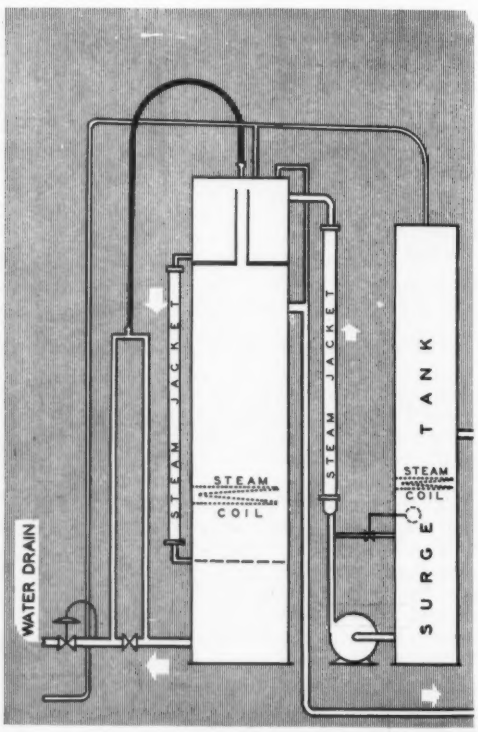
Above: Surge tank and final treater installation showing grasshooper leg and back-pressure control on water drawoff line from treater. Below, rotary pump hookup for circulating preheated emulsion from surge tank. Steam jacketed risers from individual flow lines to elevated weigh meters are visible at left

CRUDE produced in the Gilbertown field, Choctaw County, Alabama, is an undersaturated, asphaltic-base type oil having a specific gravity of about 0.94 (A.P.I. gravity 19°). Since the salt water produced in association with the oil has a specific gravity of only 1.03, the density differential of the two fluids is so narrow the water does not settle out readily. A requisite for treating the emulsion is application of considerable heat to lighten the oil and materially reduce its viscosity.

Absence of any appreciable gas recovery (gas-oil ratios run about 4 cu. ft. per barrel at a temperature of 180° F.) has necessitated that crude oil produced in the field be used as fuel for heating pruposes. This has presented a number of problems. The crude, by reason of its low gravity and other characteristics, has very poor combustion properties, and burners available for conventional types of heaters that might be used in treating the emulsion are not readily adaptable to its use. Even by preheating the fuel, which is necessary, heating elements of such heaters usually do not permit long enough burner-flame travel to afford efficient combustion of the oil.

The problem is being met in the case of 16 wells by the operation of a central heating plant employing steam as the heating medium. Because steam is generated by boilers, equipped with burners permitting injection of fuel at high pressures (175 psi.) and temperatures (225° F.) and with fire boxes providing long flame travel for fuel combustion, effective utilization of the crude as fuel





is made possible. The plant was designed and is being operated by H. L. Hunt Oil Co., the principal owner in the field.

Since, in most instances, different royalty interests and division orders are involved, separate metering of individual well production is a requisite to operation of the central treating plant. The only alternative would have been to install an individual treater and tanks for gaging at nearly every well. Considering the relatively small per-well production of from 30 to 100 bbl. of fluid daily with water ranging in amounts from 4 to 65 per cent, and the problems of firing so many individual heaters with crude oil, this procedure was not regarded as desirable.

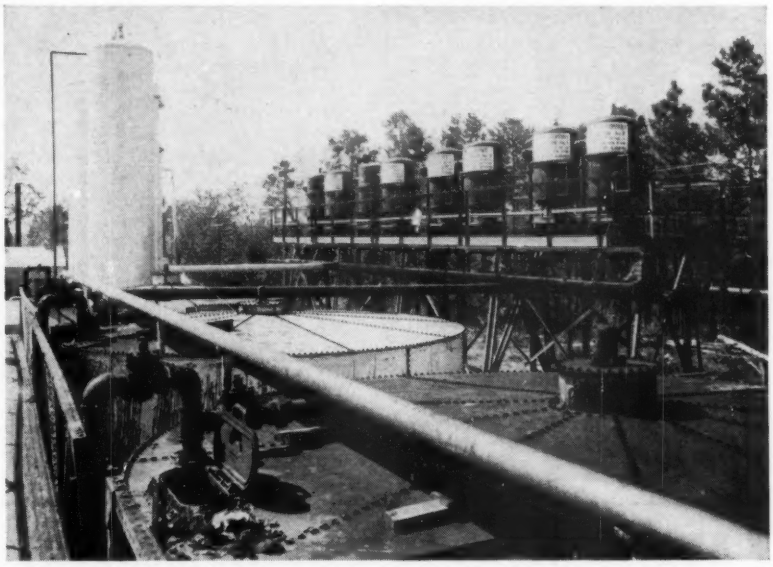
Oil Weight Meters

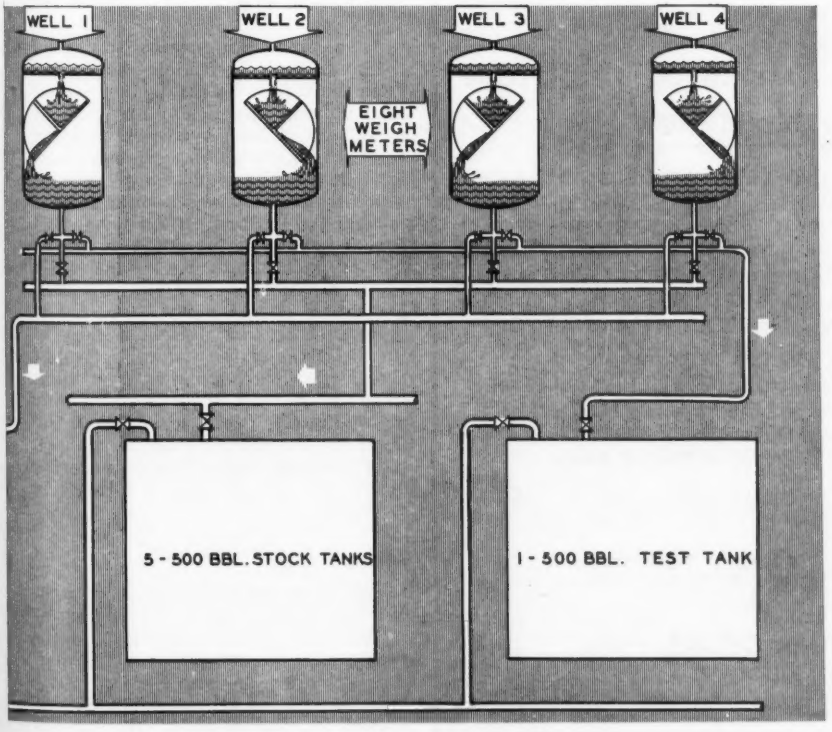
Oil weight meters are employed. These are of the medium-size, closed pressure-dome type designed to operate under 40-psi. working pressure and handle up to 500 bbl. daily (depending on the weight of the fluid). One battery of eight meters is installed at the central treating plant. Another battery for eight other wells is located in another part of the field and the metered production pumped to the treating plant for processing.

This type of meter functions by means of an oscillating bucket, divided into two equal sections, each calibrated at 20 lb. of fluid. One section fills at a time. When its capacity (20 lb. of fluid) is reached, the weight overbalances and tips the bucket, dumping the fluid from the full section. At the same time, the companion section is moved into position to fill and the operation is repeated on that side. One complete cycle of the bucket is recorded as a count on the register mounted on the side of the meter.

Volume of fluid in barrels is calculated from the number of counts on the register at 40 lb. per count by knowing the weight of the fluid per barrel with allowances for the water handled and other factors. Close check of the water production of each well is kept by frequent, periodic shake-out tests of samples obtained both at the well and at the meter. Continuous samples of the production are taken at the meter by means of a sampler arm which passes through the falling column of fluid at each dump of the bucket. This sample is carried to a 2-gal. container in the lower part of the meter and is drawn off outside, thus giving an accurate cross section of the day's run.

Accuracy of the meter calibration and the counter is checked periodically by passing the discharged fluid to a test tank provided for that purpose, and there gaging the production against the volume calculation based on the meter counter.





Above: Weigh-meter installation at Gilbertown central treating plant from top of tank battery showing treaters (left rear) and headers for filling tanks. Left: Schematic diagram of Gilbertown central metering and treating system

The meter housing is divided into two compartments, separated by a baffle. Production from the well first enters the upper or domal compartment, where the fluid is held by means of a liquid seal of approximately 6 in. This allows any foam or surge to settle and the fluid to feed evenly to the oscillating bucket, located in the bottom compartment.

Discharge from any meter can be directed to any one of three headers, one a 6-in. line with outlet to the treaters, the second a 6-in. line with outlet direct to clean-oil stock tanks for use of wells which do not make water, and the third a 2-in. line with outlet to the test tank. Meters at the central treating plant are set on an elevated platform to permit gravity flow to the treaters or tanks. Dis-

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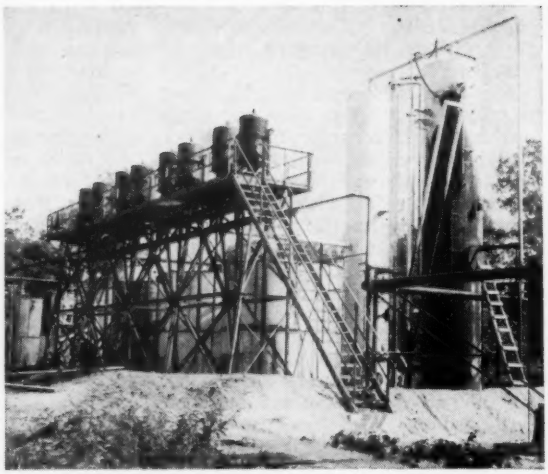

Back side of central metering and treating installation, showing elevated weigh meters for gravity flow to treaters and stock tanks (rear)

charge headers are supported along the length of the under side of the platform, reducing the amount of piping for meter outlet connections to minimum.

Heat for treating is applied in successive stages of operation with a view to building up and maintaining temperatures over a relatively long flow interval. Initial heat is applied in steam-jacketed 2-in. risers from the individual well lead lines to the inlets of their respective elevated meters. In this step from 10° to 20° of heat is picked up, raising the temperature of the streams to the meters to about 110° F. (Temperatures of well production range from 90° F. to 100° F.).

From the meters, the stream to be treated passes first to 30-ft. by 4-ft. surge column, and thence to the final treater. No separation of fluids is made in the surge column, which is provided solely to absorb any slugs or heads that might come over from the meters and allow time for stabilization of the stream and elimination of turbulence. The surge tank, however, is provided with an internal steam-heating element by which temperature in the column is maintained at from 120° to 125° F., resulting in the stream picking up an additional 10° to 15° of heat.

A small turbine-driven rotary pump takes suction from the bottom of the surge tank and lifts the stream through a 4-in. steam-jacketed riser to the top of the final treater. Through the steam jacket on this line, temperature of the stream is raised another 20° to 25° to about 140° to 145° F.

As a precaution against pumping the surge tank dry should the stream from the meters be cut off or reduced to a volume insufficient to maintain fluid level, a 2-in. bypass is installed from the rotary upmp discharge to an inlet in the side of the surge tank at a point just below where it is desired to hold the minimum fluid level. The bypass is fitted with a float-operated valve which opens when the fluid level in the surge tank drops below the bypass inlet. Since the bypass has a lower head than the 4-in. riser to the top of the main treater, opening of the bypass valve allows the fluid in the surge tank to be recycled, thus maintaining the fluid level. When the fluid level again rises above the bypass inlet, the valve closes and normal circulation to the main treater is resumed.

Final Treater

The final treater is a 30-ft. by 5-ft. column. Inlet is to a 4-ft. compartment in the top. The upper compartment, although not normally needed, was provided to disperse any turbulence or foaming that might be incurred in circulation of the stream

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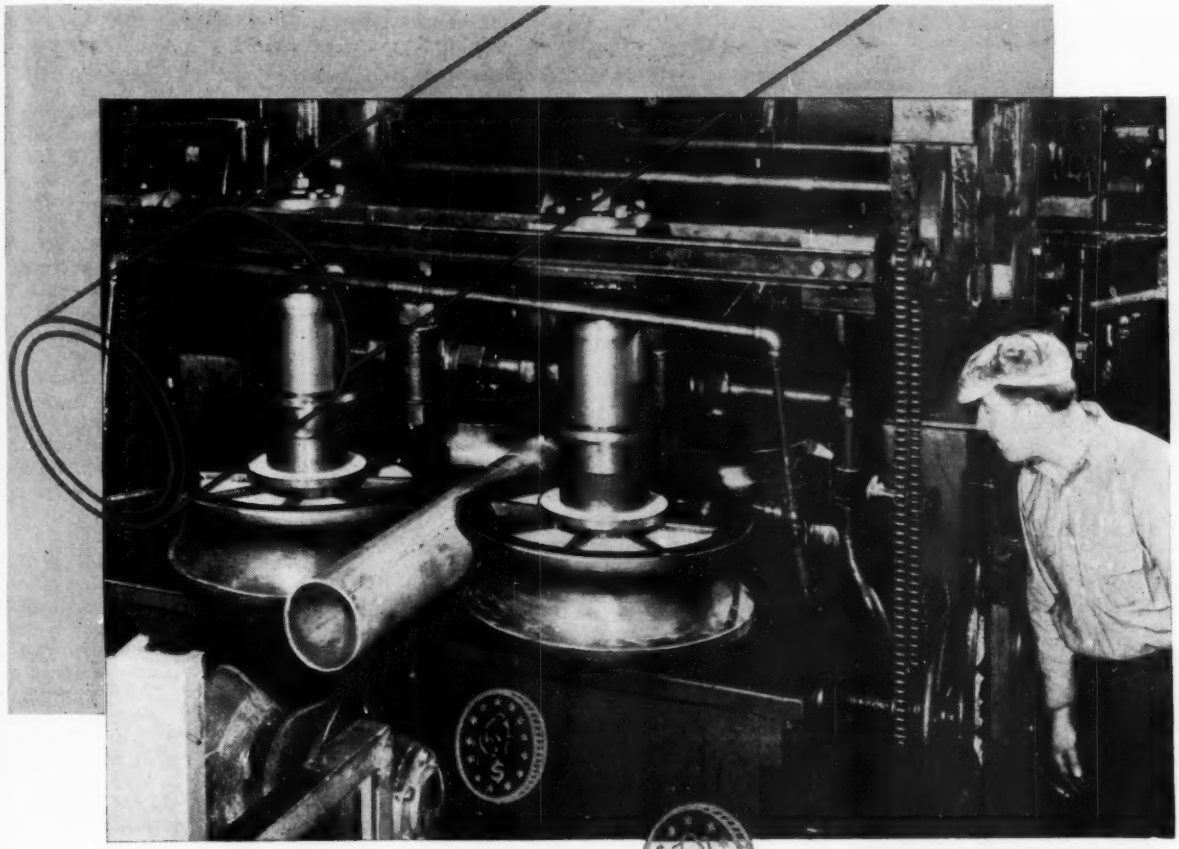

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to the column and allow for venting of possible gas heads that might be carried over with the fluid, and thus insure complete stabilization of the fluid in the bottom settling compartment.

Outlet from the bottom of the top compartment is to a 4-in. line leading down the outside of the column to a side inlet to a spreader in lower part of the settling compartment. This line also is steam jacketed so that in passage of the stream between the compartments additional heat is picked up. Temperature in the column is maintained around 180° F. by an internal steam-heating element.

Pressure in the two compartments is equalized by a center opening in the separating baffle. Fluid intercommunication through the opening is prevented by a riser extending above the fluid level in the top compartment. Clean oil, treated by the effectiveness of the system to less than 0.6 per cent water, is drawn from the top of the lower compartment through a 4-in. line to storage. Water level is controlled through a grasshopper leg setting and a back-pressure valve on the 4-in. drain line from the bottom of the column. The valve is set to hold just enough back pressure (about 5 psi.) on the drain to support the desired fluid head (at this time from 6 to 8 ft.) in the discharge side of the grasshopper leg. With any rise of water head in the grasshopper leg, the additional pressure exerted on the valve causes it to open, allowing the water to drain off until the head pressure drops to the valve setting point. In normal operation the valve remains open just enough that the water drains off in an almost continuous stream at a rate that holds the desired fluid level. A 1-in. pressure-equalizing line connects the top of the grasshopper leg with the gas vent line from the tops of two treater columns. Without this precaution, any buildup of pressure in the treater, due to a possible gas accumulation, though small, would seriously affect fluid-level control in the treater unless compensating adjustment is made in the pressure control on the grasshopper leg.

Two 90-hp. boilers, operating alternately at 105 psi. working pressure generate the steam for heating. Initially, live steam from these boilers was used for a reciprocating steam engine driving generators to supply electric power for field pumping operations, and the exhaust steam used for treating heat.* Recently, with a switch to use of purchased electric power supplied by Alabama Power Co., the generating plant has been shut down, releasing the live steam for heating purposes.

Operation of the steam and power plant, located adjacent to the central plant, was described in a previous article.* The only essential change in operation of the boilers, occasioned by the shutdown of the power plant, lies in the utilization of steam condensate for boiler feed water, thus effecting substantial savings in raw-water consumption and reductions in boiler-maintenance requirements. Although provision was made initially for use of the condensate, this procedure was not followed as the exhaust steam condensate contained a certain amount of oil picked up in engine operation which would have had to be filtered, and this expense was not considered justified. Since only one boiler is required to supply the necessary heating steam, operation of the boilers is rotated, permitting boiler cleaning and repairs without shutting down the plant.

*Neil Williams, "Central Electric Power Plant Solves Pumping Problem at Gilbertown." The Oil and Gas Journal, Nov. 17, 1945.

Harry H. Johnson, formerly assistant to the vice president of Gulf Oil Corp. at Houston, has retired from active duty with the Army after 5 years' service. Johnson held the rank of major general and recently was awarded the Distinguished Service Medal.

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

An Exchanger Design

THIS design computation serves as a summary of the many Refiner's Notebooks on heat exchange. The design of an exchanger involves so many mechanical features that cannot be known until the design is complete that a trial-and-error method must be followed. In order to start the design it is necessary to estimate or assume an over-all transfer rate by means of which the approximate dimensions, number of tubes, spacings, etc., can be judged. If the assumed transfer rate is badly in error it is necessary to recompute the entire design.

Consider an exchange service which involves heating 5,000 bbl. per day of a 38° A.P.I. mixed-base crude oil (at 310° F.) by means of 26° A.P.I. topped crude oil available at 520° F. Quantities and other useful figures are:

	Per cent	G.H.P.	A.P.I.	Sp. Gr.	Lb./gal.	Lb./hr.	Available at
Topped crude...	49	4,290	26	0.898	7.48	32,100	520° F.
Crude oil.....	100	8,750	38	0.835	6.95	60,800	310° F.

Other necessary data or conditions will be discussed as required.

Economical approach.—The amount of heat to be removed is discussed in Notebook No. 71, December 8, 1945. The ratio of fluids in this exchanger will be:

$$R = \frac{32{,}100}{60{,}800} = 0.53$$

If depreciation within 3 years is contemplated the most economical approach will be about 55° F. The approach will occur at the low-temperature end of the exchanger as shown in Fig. 1. Thus, the outlet temperature of the topped crude oil will be 310° plus 55° or 365° F.

Heat duty.—The heat duty (Notebook No. 78, January 26, 1946) computed from the topped crude oil will be:

$$32{,}100\ (520 - 365)\ 0.645 = 3{,}220{,}000$$

B.t.u./hr.

The 0.645 is the specific heat of liquid topped crude at the average temperature of 442° F. (Notebook No. 40, May 5, 1945).

The outlet temperature of the crude oil (see Fig. 1) can be computed by means of a heat balance (Notebook No. 78, January 26, 1946).

$$310 + \frac{3{,}220{,}000}{60{,}800 \times 0.62} = 396°\ \text{F.}$$

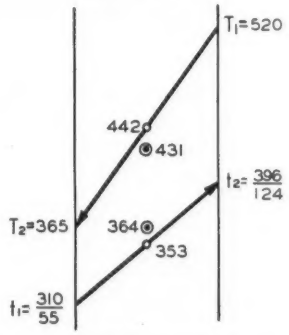


Fig. 1—Mean-temperature diagram

Assumption.—It is now necessary to make the basic assumption of transfer rate. Experience or reference to tabulations of over-all transfer rates such as page 428 of Petroleum Refinery Engineering, 2nd. Ed. (McGraw-Hill Book Co., New York) will be helpful. Rates from 10 to 25 have been encountered but for a desalted crude oil and for a properly designed exchanger a rate of 25 is logical.

Temperature difference and surface.—The average temperature difference between the two fluids of Fig. 1 is discussed in Notebooks Nos. 73 (December 22, 1945), 75 (January 5, 1946) and 77 (January 19, 1946). The mean temperature difference is 85° F. (Notebook No. 75) and the approximate surface is:

$$\frac{3{,}220{,}000}{25 \times 85} = 1{,}520\ \text{sq. ft.}$$

The total length of tubing can be computed from the constants shown in Notebook No. 87, April 6, 1946. For 12 B.W.G.-¾-in. tubing:

Sq. ft./ft., length	0.1963
Sq. in., internal	0.223
Sq. in., external	0.442

The total length:

$$1{,}520 \div 0.1963 = 7{,}750\ \text{ft.}$$

Routing.—Which stock should be passed through the tubes is discussed in Notebook No. 83, March 2, 1946. The crude oil will be passed through the tubes because they are better able to withstand the high pressure of 170 or more pounds per square inch. It is also reasonable to pass the topped crude through the shell because it is somewhat viscous, its volume is small, and not much pressure

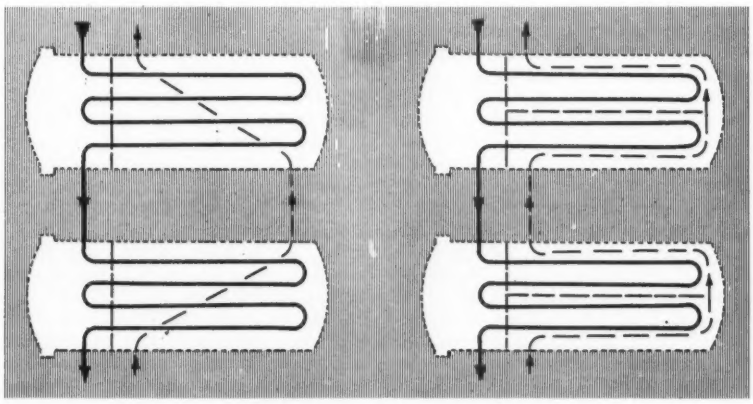


Fig. 2a—(Left) Eight-tube-pass, two-shell-pass arrangement.

Fig. 2b—(Right) Eight-tube-pass, four-shell-pass arrangement.

No. 102 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

is available if the topped crude flows to storage by gravity flow.

Passes.—The number of passes that should be employed is discussed in Notebook No. 77, January 19, 1946. The two factors by which the situation is judged are:

$$\frac{t_2 - t_1}{T_1 - t_1} = \frac{396 - 310}{520 - 310} = 0.41$$

$$\frac{T_1 - T_2}{t_2 - t_1} = \frac{520 - 365}{396 - 310} = 1.8$$

Examination of the tables of Notebook No. 77 for these conditions indicate that at least two shell passes and four tube passes must be employed. For such an arrangement the correction factor for the mean temperature difference is about 0.89. If a single-pass shell arrangement were attempted it would operate at a factor of only about 0.45 or only 45 per cent efficient. Detail can only be determined by further computations and hence the volume of crude oil at the average temperature of 353° F. (specific gravity is 0.72, Notebook No. 88, April 13, 1946) is:

$$\frac{8{,}750}{7.48} \times \frac{1}{3{,}600} \times \frac{0.835}{0.72} = 0.377 \text{ cu. ft./sec.}$$

in which 7.48 is the gallons per cubic foot, and 3,600 is seconds per hour.

Tube passes.—At a crude oil tube velocity of 3 ft. per second the cross-sectional area per pass and the tubes per pass are:

$$\text{Area} = \frac{0.377}{3} = 0.126 \text{ sq. ft.}$$

or 18.1 sq. in.

$$\text{Tubes/pass} = \frac{18.1}{0.223} = 82$$

The total length of flow through the tube pass is:

$$7{,}750 \div 82 = 94.4 \text{ ft.}$$

This is a little short for four 12-ft. passes in two exchanger shells ($2 \times 4 \times 12 = 96$) but it is hoped that two units or shells of exchanger each with four tube passes will be satisfactory. A higher tube velocity than 3 ft. per second would call for even more passes or more than two units of exchangers. This would be awkward from a construction standpoint and hence a tube velocity of 3 ft. per second or less is contemplated. The arrangement of two units of exchanger each with a single shell pass and four tube passes is equivalent to a single exchanger with two shell passes and eight tube passes as indicated in Fig 2 (a).

Tube transfer rate.—In order to compute the film-transfer rate for the crude oil through the tubes, it is necessary to estimate the film temperature as in Notebook No. 92, May 11, 1946. The film temperature will be about 353° plus 11° or 364° F. and the viscosity according to Notebook No. 93, May 18, 1946, will be 0.47 cp. The film-transfer rate of the crude oil in the tubes (Notebook No. 91, May 4, 1946) will be about 200. According to Notebook No. 94, May 25, 1946, the fouling factor for a desalted crude oil at a velocity of 3 ft. per second will be about 3.3.

Diameter of shell.—The diameter of the shell can be estimated by determining the number of tubes that lie across the diameter and then multiplying by the center to center spacing (1⅛ in.) of the tubes.

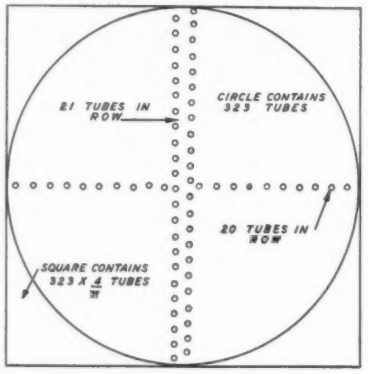


Fig. 3—Theory for estimating shell diameter

$$\text{Total tubes} = \frac{7{,}750}{12} = 646$$

$$\text{Tubes/unit} = 646 \div 2 = 323$$

$$\text{Dia.} = \sqrt{\frac{323 \times 4}{\pi}} \times 1.125 = 23 \text{ in.}$$

An attempt to explain the theory underlying the computation of diameter is offered in Fig. 3.

Shell velocity.—The specific gravity of the topped crude oil at its average temperature of 442° F. is 0.77 (Notebook No. 88, April 13, 1946), and the volume of the topped crude at 442° F. is:

$$4{,}290 \times \frac{0.898}{0.77} = 5{,}020 \text{ g.p.h.}$$

Many refiners and exchanger designers frown on the use of shell baffles in exchangers for residue stocks. Also, examination of the shell-velocity chart of Notebook No. 89, April 20, 1946, shows that 5,020 g.p.h. is such a small amount of material for a 23-in. shell that lines are not even shown on the chart. For these reasons, the shell will be designed for no baffles and later in this discussion the use of baffles will be considered. The free volume of the shell is obtained by subtracting the tube volume from the shell volume:

$$23^2 \times \pi \div 4 = 416 \text{ in.}^2$$
$$323 \times 0.442 = 143$$
$$\text{Free volume} = 273$$

The approximate velocity will be:

$$\frac{5{,}020}{3{,}600} \times \frac{1}{7.48} \times \frac{144}{273} = 0.1 \text{ ft./sec.}$$

Over-all transfer rate.—According to Notebook No. 93, May 18, 1946, the viscosity of the topped crude is about 0.5 at its film transfer of 442 minus 11 (Notebook No. 92, May 11, 1946) or 431° F. Its film-transfer rate is very low, perhaps 40 or less (Notebook No. 92) and the fouling factor (Notebook No. 94, May 25, 1946) is about 3.3. Using these values, the over-all transfer rate and the amount of surface is:

$$H = \frac{1}{\frac{1}{40} + 0.003 + \frac{1}{20} + 0.0033}$$

$$= 27.5 \text{ B.t.u./sq. ft.-hr.-°F.}$$

$$A = \frac{3{,}220{,}000}{27.5 \times 85 \times 0.89} = 1{,}550 \text{ sq. ft.}$$

These values do not perfectly check the original estimates of 25 and of 1,520 sq. ft. but they are sufficiently close to permit a detailed layout of the exchanger.

Shell Baffles

Space does not permit a complete design of the eight-tube-pass four-shell-pass arrangement of Fig. 2(b). However, such an arrangement allows the use of crossbaffles in the shell, a final transfer rate of about 49, the use of only 845 sq. ft. of surface and a shell diameter of only 20 in. This arrangement permits illustration of the use of the velocity chart of Notebook No. 89, April 20, 1946.

Using two passes through the shell of each unit is the equivalent of sending twice as much material through the shell, or $2 \times 5{,}020 = 10{,}040$ g.p.h. Examination of the velocity chart of Notebook No. 89 for a 20-in. shell and for 10,040 g.p.h. shows approximately:

D/x	Baffle spacing	Velocity
1.5	19 in.	0.6
1.25	16 in.	0.7
1.0	12 in. plus	0.8

Pressure drop.—At a 4-ft.-per-second velocity through ¾-in. tubes, Notebook No. 97, June 15, 1946, indicates a pressure drop of 0.3 psi. for a 10-ft. length of travel, and for the actual total travel of 80 ft.:

$$\frac{80}{10} \times 0.3 = 2.4 \text{ psi.}$$

At a velocity of 0.7 ft. per second through the shell, a D/x spacing of 1.25, and a space between tubes of ⅜ in., Notebook No. 98, June 22, 1946, indicates a pressure drop of 0.14 lb. for a 10-ft. travel. The shell fluid makes four such passes and hence:

$$\Delta P = 4 \times 0.14 = 0.56 \text{ psi.}$$

Engineering Fundamentals

No. 244

A FEATURE OF THE OIL AND GAS JOURNAL

Principle of Stadia and Stadia Surveying (continued)

IN stadia surveying the instrument is set up over point X (Fig. 1) and leveled carefully. Next the H. I. is measured with a tape, generally to the nearest 0.1 ft. Suppose its value is 5.2 ft. The rod is then held vertically on point Y and sighted by the instrument from point X. Usually the lower cross hair is set at some whole foot mark, B, which will displace the middle hair but a minimum distance from the H. I. value on the rod. The setting of the cross hair on B is done by means of the clamp and tangent screw on the horizontal axis. The upper cross hair is read wherever it falls after setting the lower cross hair at B. Assume B = 3.00 ft. and A = 7.56 ft. The stadia intercept is then 4.56 ft. By use of the tangent screw on the horizontal axis the middle cross hair is set on the H. I. value of 5.2 ft. The vertical angle is then read. Suppose it is 6° 10′. (If the transit has a control bubble on the vertical circle vernier it should be leveled before reading the vertical angle). All observations have now been made so the data can be reduced. The two standard reduction equations derived in the previous article are:

EXAMPLE

Horizontal distance = K × s × $\cos^2\alpha$ + (f+c) × $\cos\alpha$ (1)

In the above Equation 1 K × $\cos^2\alpha$ is equivalent to the value shown for H in Table 1 of the previous article, and difference in elevation = ½ K × s × $\sin 2\alpha$ + (f+c) × $\sin\alpha$ (2)

In the above Equation 2 ½ K × $\sin 2\alpha$ is equivalent to the value shown for V in Table 1 of the previous article.

The tabular values of H and V for an angle of 6° 10′ (α) as shown in Table 1 of the previous article are: H = 98.85 and V = 10.68. The usual value of (f+c) for an external focusing instrument (as pictured in Fig. 1) is 1 ft. Substituting in Equations 1 and 2 above

Horizontal distance
= 4.56 ft. × 98.85 + 1 ft. × cos 6° 10′
= 4.56 ft. × 98.85 + 1 ft. × 0.9942
= 450.76 + 0.99
= 451.75 ft.

Difference in elevation
= 4.56 ft. × 10.68 + 1 ft. × sin 6° 10′
= 4.56 ft. × 10.68 + 1 ft. × 0.1074
= 48.72 + 0.11
= 48.83 ft.

Equations 1 and 2 can be simplified to the following approximate equations for external focusing instruments with an (f+c) of 1 ft.

Horizontal distance = K (s + 0.01) $\cos^2\alpha$ (approx.) (3)

and difference in elevation = ½ K (s + 0.01 $\sin 2\alpha$ (approx.) (4)

Substituting the observed and tabular values into these equations

Horizontal distance = 4.57 × 98.85
= 451.75 ft.

Difference in elevation = 4.57 × 10.68
= 48.81 ft.

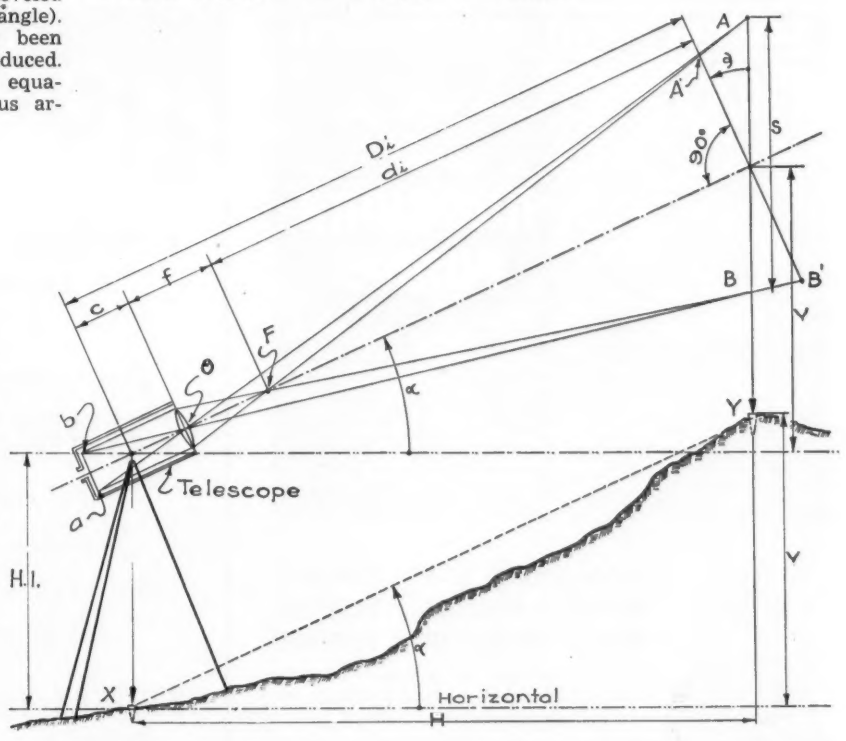
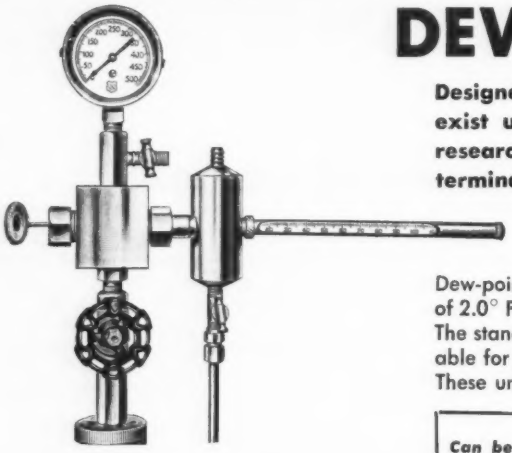


Fig. 1—Determination of horizontal distances and differences in elevations by stadia surveying are here diagramed. The accompanying example illustrates two methods of calculation. Note that the difference between them is slight and since horizontal distances are usually computed to the nearest foot and differences in elevation to the nearest 0.1 ft., the results by either method would be reported as 452 and 48.8 ft., respectively

Series prepared by Dr. E. A. Stephenson, head of petroleum engineering school, and Prof. D. Don Haines, department of civil engineering, University of Kansas



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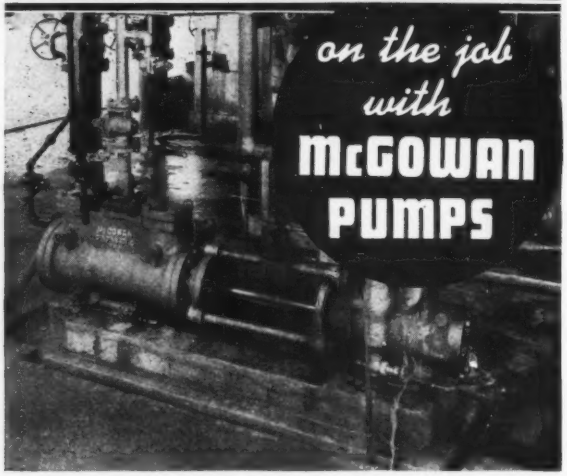

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Steam Stripping Reduced Crude Oils

In your question of July 21, 1945, you give distillation curves of reduced crude oils obtained by flashing at 400°, 550°, and 650° F. but you do not say from what kind of a crude oil. You say, "from the flashing of a crude oil." Are we to assume that these curves are for the regular 37° A.P.I. crude oil?—I. A. H.

No mention of the kind or type of crude oil was made in connection with the curves presented because unless the crude oil is extremely freakish its distillation curve will not greatly affect the composition of the topped crude oil, particularly with respect to steam stripping. Only if the crude oil contains no material boiling below about 150° F. or if it contains no high-boiling (above about 800° F.) material will the kind of crude oil have much effect. This is because substantially all of the material boiling below 150° F. will be in the overhead product and likewise all of the material above about 800° F. will appear in the residue. Only the material between these temperatures (150° and 800° F.) will be split between the overhead and bottoms products of the flash. The crude oil considered in the question of July 21, 1945, had an A.P.I. gravity of 42°.

Several methods could be employed for making the curves applicable to any crude flashed at any temperature, but the scant knowledge available for computing such curves and our scant knowledge of computing the amount of stripping steam required, do not justify a detailed study.

Voltolized Oils

What is voltolized oil? Does it have a low pour point?—B. R. S.

Voltolized oils are ones that have been subjected to a high-frequency electrical-glow discharge which greatly increases the viscosity of the oil. Viscosity appears to be the only property which is greatly affected by voltolization, but since low-boiling, low-pour-point oils are used as the feed or charge stock, it is possible to make high-viscosity oils of low pour point. Thus a neutral oil (or red oil) of 55 seconds Universal Saybolt viscosity at 210° F., when voltolized may exhibit a viscosity of 450 seconds at 210° F. In such a process the color does not deteriorate and there is no indication of oxidation. The process was practiced in Germany on vegetable, animal, and fish oils.

The process has attracted little attention of late but was widely discussed 15 to 20 years ago. The main plant was that at Potschapple, Germany. The process was conducted in a horizontal cylindrical steel vessel having a capacity of about 7,500 gal. A vacuum of about 25 in. mercury was maintained and the oil was kept at about 175° F. by means of water coils. The vessel was charged with only 2,000 gal. of liquid and hence it seems probable that voltolization occurs in a rarefied gas phase. Possibly some sort of rupture of the molecule occurs, followed by recombination or polymerization of the fragments. About 50 hours was required in the German stills for handling a 2,000-gal. charge.

Four electrode elements are provided in each still and the electrodes can be removed from the top of the still through large rectangular manholes by the use of a small traveling crane. The four elements of electrode are mounted on a revolving shaft which is sealed through the end of the still by an oil-sealed stuffing box. The electrodes themselves consist of thin (0.04-in.) aluminum plates (32 in. square) insulated from each other by fiberboard and held apart (0.4 in.) by blocks of wood. The total space between each pair of electrodes that is open to vapor or oil is about 0.3 in. A dipper-like attachment connected to the rotating electrodes and shaft picks up oil and dumps it over the electrodes so that it is exposed to the glow discharge.

In 1925 the output of the Potschapple plant which consisted at that time of four units or vessels, was about 28,000 bbl. per year. The throughput is small for the elaborate equipment and the cost of power is large.

The Channel Black Process

Simplified Flow Diagram

Will you present a discussion similar to that of May 11, 1946, but applied to channel black?—F. M. C.

Fig. 1 indicates the production of carbon black by the well-known channel process. It gets its name from the use of movable steel channels which are supported in gas flames burning in insufficient air. The somewhat cold surface of the channel assists in halting combustion. Carbon deposited on the channel is scraped from its surface and carried by conveyors to equipment in which particles of gritty material are removed, air is shaken out to produce a more compact material, and finally it is formed into beads or pellets by a special method of agitation and pelleting without the use of binding agents.

Gas is burned from numerous (3,000 to one burner house) small lava tip burners. Each burner handles 50-75 cu. ft. of gas per 24 hours. The luminous flame impinges on the wide side of the steel channels. Yields are only 1-2.1 lb. of black per 1,000 cu. ft. but the exceedingly small partical size, excellent coloring power, and enormous surface area make it highly prized for many purposes, notably for compounding with natural rubber. Some of its properties compared with other blacks are:

	Finest channel (CC)*	Easy processing channel (EPC)*	High modulus furnace (HMF)*	Lampblack	Medium thermal (MT)*
Average diameter of particle, mμ	10-20	30-33	50-60	100-200	250-500
Surface area, sq. meters per gm.	250-125	90-80	60-50	12-24	10-5
pH of a sludge of black in water	4-5	4-5	10	5	7
Tinting strength	Very high	High	Medium	Medium	Medium

*Abbreviations of the War Production Board.

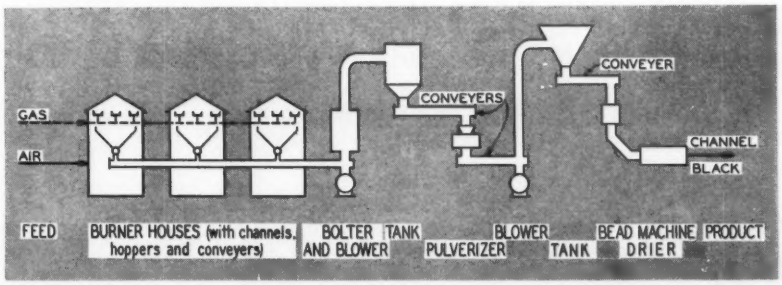
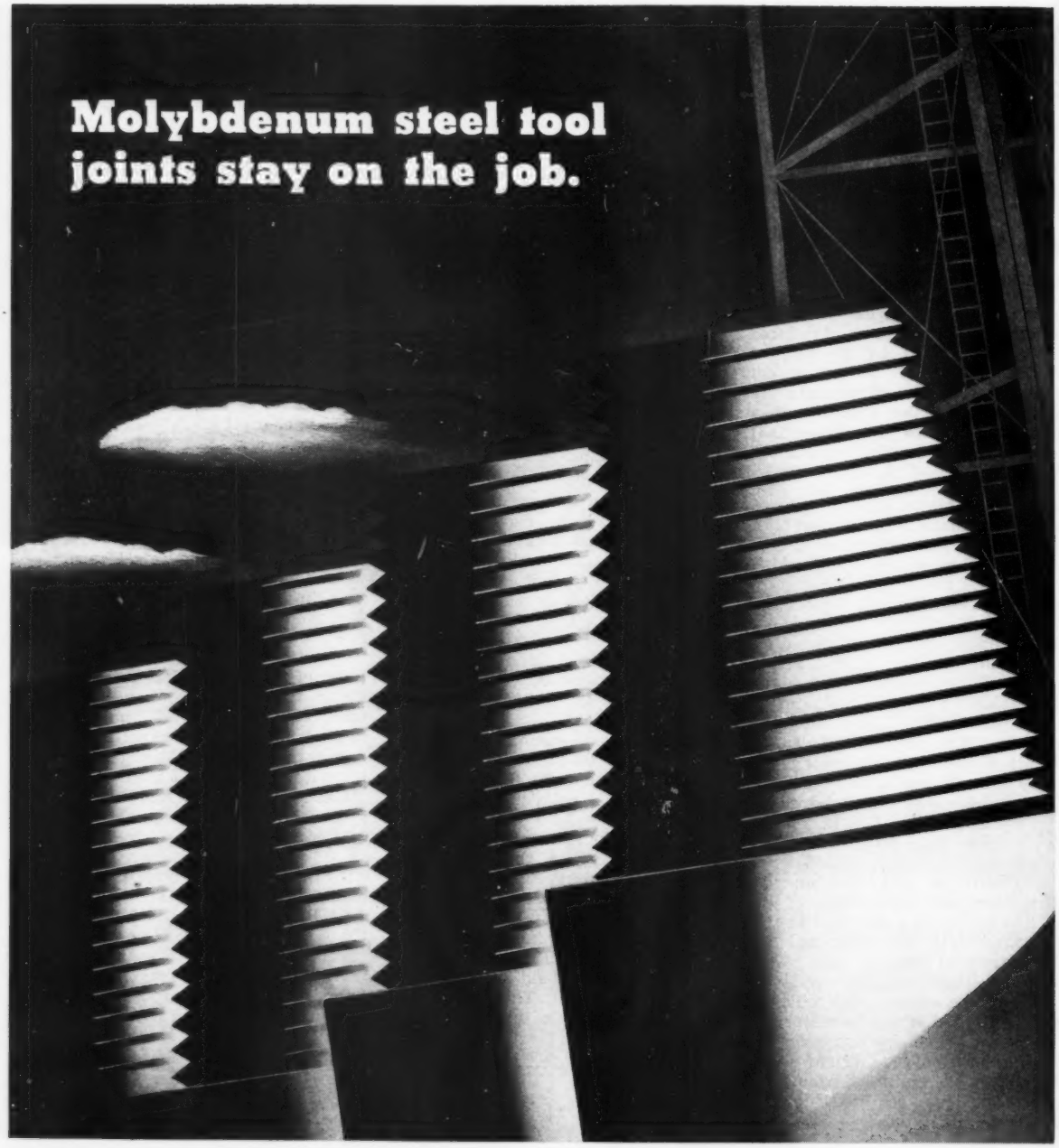


Fig. 1—Simplified flow diagram of channel-black process



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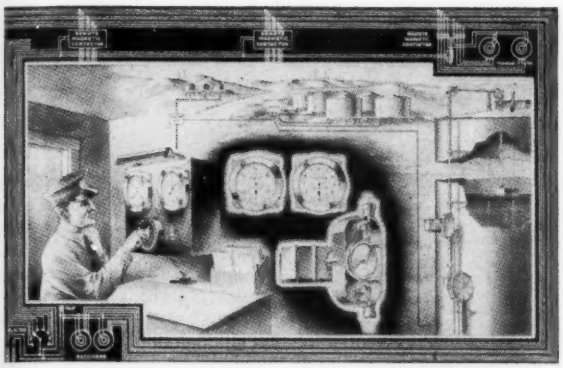
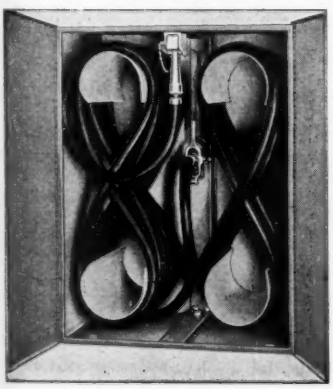
by L. L. Jones Jr.

(1) REMOTE - READING TANK GAGING system is designed for speed, accuracy, and safety in automatic tank gaging. Heart of the system is the Selsyn motor, whose



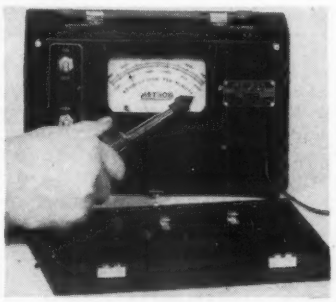
simplicity, accuracy, and practical infallibility have been proved on shipboard, in engine room, navigation control, and other items of equipment which must be operated from remote positions. As illustrated, a transmitting unit is employed at each tank. *Shand & Jurs Co.*

IT'S NEW CHECK IT



(2) FOG FIRE-FIGHTING UNIT recently introduced to industrial uses embodies 4-second fire fighting with a finely atomized fog furnished only by normal pressure of city water systems. Unit when needed is connected directly to water line. A valve-actuating fixture holds the fog nozzle for instant use and fog appears from the nozzle within 4 seconds after removing nozzle from the automatic valve fixture in the cabinet of the unit. *Bowser, Inc.*

IT'S NEW CHECK IT



(3) OVERSPEED TACHOMETER now available for overspeed testing of turbines, generators, and motors. This very sensitive portable tachometer has two ranges for testing either 1,800 or 3,000-r.p.m. machines. The accuracy on both ranges is ¼ of 1 per cent. Instrument has only two switches, on-and-off switch, and high-and-low-range switch. Does not employ use of generator or magneto. Operating power is obtained from regular a.c. source of 105 to 125 volts of 60 cycles. *Metron Instrument Co.*

IT'S NEW CHECK IT

(4) NEW FLEX - TUBE THREE-WAY VALVE is designed for handling all types of fluids, including gases, chemicals, and liquids. Nonmetallic construction permits handling of highly corrosive or erosive liquids or gases. Especially suited for hydraulic or pneumatic-cylinder operation, valve is operated by means of turning an overcenter cam which opens and closes ports at each halfturn of handwheel. Available in ⅛ and ¼-in. I.P.S., valves are furnished for working pressures up to 250 psi. and maximum temperatures of 150° F. *Grove Regulator Co.*

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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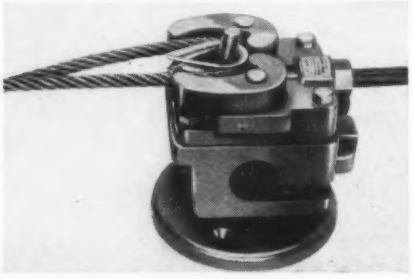
OIL AND GAS EQUIPMENT Digest

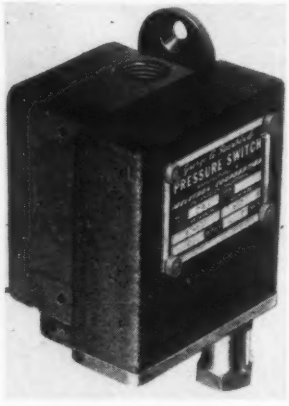
IT'S NEW CHECK IT

(5) WIRE ROPE VISE now in production will eliminate on-the-job problems of making permanent loops in wire rope and cables. Named Cabl-Vise by manufacturer, the vise pictured here takes rope sizes through ½-in. Vise



will be introduced later which will handle ropes of heavy duty size through 1½ in. The device is equipped with a swivel base that accommodates the vise in either vertical or horizontal position; also rotates through a complete 360°, clamping firmly in any desired direction. *Nunn Manufacturing Co.*

IT'S NEW CHECK IT



(6) PRESSURE - OPERATED SWITCH permitting adjustments without exposing electrical circuit is new development of California manufacturer. The unit incorporates an explosion-proof Underwriters listed micro-switch. Called model series 320, the new switch is suitable for atmospheres containing vapors of ethyl ether, ethyl alcohol, gasoline, acetone, petroleum, naphtha, lacquer, solvents, and natural gas and grain dust. *Meletron Corp.*

IT'S NEW CHECK IT

(7) FOLDING SAFETY STEP FOR TRUCKS is mounted under the bed at back of truck either in center or at each side. Reduces accidents, hernia cases, and enhances important savings in time and money; also cuts down on driver fatigue. Four bolts fasten step to bed of truck. All-metal construction features non-slip-tread step. Supports tested weight of 1,000 lb. Step weighs only 40 lb. *Safety Step Co.*

IT'S NEW CHECK IT

(8) NEWLY DESIGNED SOIL RESISTIVITY METER, Model 243, is constructed for express purpose of securing accurate knowledge of electrical resistivity in soils. The oil industry and other allied industries concerned with damage and destruction wrought by electrolysis and corrosion from soil currents on underground equipment can benefit greatly by the use of such an instrument. Protection founded on positive readings of resistivity can prevent much of this damage. The meter is readily portable, weighing only 19 lb. Measures ohms total resistance, calibrated to read units of ohms per cubic centimeter, and full-scale reading of 30,000 ohms per c.c. *Associated Research, Inc.*

IT'S NEW CHECK IT

(9) NEW PORTABLE ELECTRIC HAND LAMP designed for express purpose of providing extremely bright light. Small unit weighs only 5 lb., and will deliver a brilliant 1,500-ft. spot beam or bright localized spread light. Ideal for use on drilling rigs, night pipe-line emergency work, water-pump repair, or for casting light on back of oilfield truck. Long life from two standard dry-cell batteries. *U-C Lite Manufacturing Co.*

IT'S NEW CHECK IT

(10) PERMAFLO CHOKE will not "cut out." Planned for hard-to-hold wells with fast high-pressure cutouts, this flow bean resists wear from sand abrasion. A bronze sleeve is used with a platinum-gold thermide seal and the liner is of wear-resistant porcelain. Remarkable records have been set up in tests in the Corpus Christi area. On some of the worst sanding conditions—flow pressures of more than 1,600 psi.; after 18 months, choke had less than 0.001 per cent of wear. Adapter bushings for all sizes are available. *Schick-Siegal Industries.*

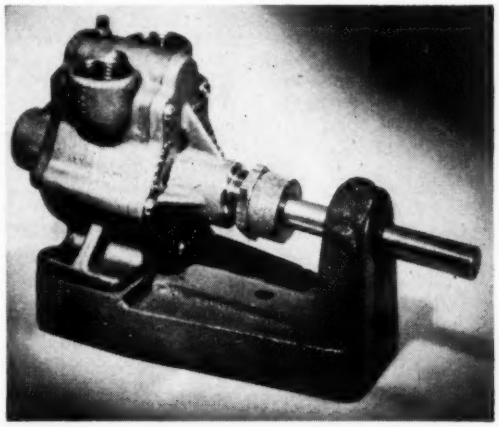
IT'S NEW CHECK IT

(11) "NAIL-IT" PIPE COUPLINGS employ unique coupling and sealing principles. The units are joined by two or more common nails, driven into mating grooves cut in the male and female ends, are uncoupled merely by pulling the nails. The nails form a removable steel shear ring around the coupling. "Nail-Its" are free to swivel under low pressures and are recommended for temporary or permanent water, fuel or flow lines, pump

suctions, mud guns, and other installations. Available in sizes from 2 through 6-in., working pressures of 1,000 to 3,000 psi. *Krausse Manufacturing Co.*

IT'S NEW CHECK IT

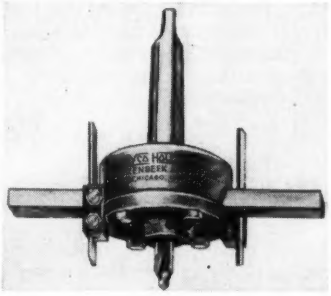
(12) NEW DOUBLE-IMPELLER GEARLESS 1-IN. PUMP with standard 1-in. connections and a builtin external driveshaft bearing and base is now on the market for the circulation of water, light oil, and other liquids. De-



signed to eliminate common causes of pump failure such as gear jamming and stripping, the pump employs double impellers made of several layers of a pressure-vulcanized, laminated material, and can pump equally well in either direction. *Eco Engineering Co.*

IT'S NEW CHECK IT

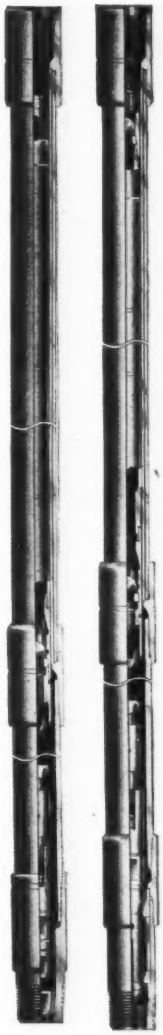
(13) HEAVY-DUTY HOLE AND WASHER CUTTER for production work is a new tool designed to cut clean round holes or washers from steel plate up to ½-in. thickness. The new device cuts as accurately to size as a boring tool. It fits 1-in. drill chuck, or can be supplied with Morse taper shank. Tool holders and body are of heavy steel and are extremely rigid. *Wyzenbeek & Staff, Inc.*



IT'S NEW CHECK IT

(14) LUBRICATOR FOR TOOL-JOINT BOXES ON DRILL PIPE to prevent galling and aid antiseize methods on a drilling rig is designed to conserve various types of tool-joint compounds used on rig floors. The new lubricator operates on the grease-gun principle. Mechanical part of lubricator is approximately the size of a 3-gal. can. This body holds tool-joint compound. Hydraulic action forces compound through length of rubber hose and out perforations in sides of cone-shaped aluminum cup. Cup comes in various sizes to fit all sizes and shapes of tool-joint boxes. Foot pedal on side of body provides power for forcing compound. Rubber hose can be extended to reach position near driller and can be operated from this point while floorman places and removes ejector end from tool joint. *Fred Godon Tin Shop.*

(15) TUBING "FULL LINER" PUMP uses a one-piece alloy steel liner. The high tensile strength makes it possible to reduce wall thickness to less than half and in turn permits the liner jacket to be reduced in size accordingly. Substantially decreases the number of parts required. No misalignment hazards give free plunger travel. *Fluid Packed Pump Co.*

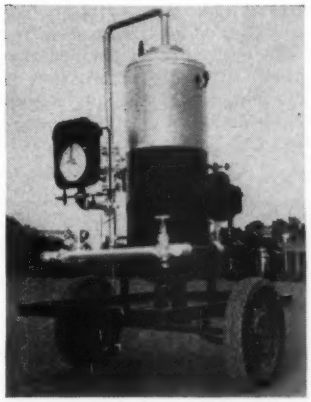


IT'S NEW CHECK IT

(16) NEW SEALING COMPOUND produces a high-efficiency seal which cannot be penetrated by air, water, steam, gas, gasoline, oil, hydraulic fluids, and aromatics. Product is a paste of uniform consistency, containing no free metallic particles or other substances subject to washing out. Flows and spreads smoothly to form ribbon gaskets. Possesses good antiseize characteristics. Compound is soluble in alcohol or carbon tetrachoride simplifying cleaning up. Seal breaks immediately with the application of minimum force when dismantling object used on. Available in tubes and metal containers ranging from 8 oz. to 5 gal. *Parker Appliance Co.*

IT'S NEW CHECK IT

(17) ROLO WELL CHECKER is new accurate, efficient means of daily well recording without the use of special tanks. The Wellchecker is a mobile or permanent metering unit complete with automatic sampler. Pictured is



the mobile arrangement showing orifice fitting, orifice meter, and oil meter with automatic b.s.& w. sampler. Line strainer is standard equipment. All trailers have springs, also front and back trailer rests. Permanent unit available with or without skid mounting. *Rolo Manufacturing Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(18) TOOL STEELS CAST TO SHAPE. New bulletin presents methods of casting cutters, forming tools, gages, rolls, etc., to desired shape, producing savings of time, labor, and machine cost. Standard shapes available are illustrated as well as certain made-to-order shapes which can be cast to customer's specifications. A new wrinkle in tool making. *Jessop Steel Co.*

IT'S NEW ✓ CHECK IT

(19) STAINLESS-STEEL BELLOWS. New 12-page booklet offers valuable information to technically minded readers concerning the use of bellows as equalizers, compensators and expansion joints, thermostatic instruments, etc. Includes specification charts and other engineering data that is well illustrated with photographs and line drawings.—*Chicago Metal Hose Corp.*

IT'S NEW ✓ CHECK IT

(20) HEAT-TRANSFER APPARATUS. New bulletin describes the patented fin section of this manufacturer's heat transfer apparatus. Tabulates 21 features and advantages of this finned-tube unit, and includes many installation views and field reports of service. *The Griscom-Russell Co.*

IT'S NEW ✓ CHECK IT

(21) RENEWING ELECTRIC MOTORS AND TRANSFORMERS. An illustrated folder explaining various steps performed by industrial electrical-repair experts in process of rebuilding electric motors, generators, and transformers. Also describes specialized equipment and materials used in restoring efficient performance and giving longer life to this type of electrical equipment now in need of repair. *Southwest Electric Co.*

IT'S NEW ✓ CHECK IT

(22) SAFETY TOOL CATALOG lists over 500 items. Standard tools have been redesigned to further increase utility and safety features and many new tools have been added. Tools recommended for use around explosive liquids, fumes, gases, dust, and to prevent fires and explosions caused by sparks from steel tools. Used in ordnance plants, refineries, mills, mines, and around marine projects. *Ampco Metal, Inc.*

IT'S NEW ✓ CHECK IT

(23) BROWN INSTRUMENTATION BULLETIN for the Fluid catalytic cracking process is a handbook covering chemical decomposition of the molecules of a substance, commonly known as "cracking." Contains information on petroleum refining, ore reduction, coking of coal, manufacture of water gas, and production of phthalic anhydride. *The Brown Instrument Co.*

(24) SUCKER RODS AND COUPLINGS. A 24-page publication on sucker rods, couplings, pony rods, and polished rods. This booklet also presents technical data on each of the above subjects including chemical analysis, physical properties, endurance limits and sizes and weights. All in accordance with A.P.I. specifications. *Emsco Derrick & Equipment Co.*

IT'S NEW ✓ CHECK IT

(25) PHYSICAL AND CHEMISTRY DATA on the Furans Furfural is contained in two new bulletins which cover structural formulas, nomenclature, compound formation, chemical properties, and methods of detection and analysis. Included in the physical details are the various types and methods of vapor pressure, solubility, specific gravity, and all physical constants of furfural. *Quaker Oats Co.*

IT'S NEW ✓ CHECK IT

(26) UNIVERSAL DIESEL NOZZLE AND INJECTOR TESTER bulletin is a new four-page brochure published to give information on low-cost portable tool designed to test all makes and models of diesel nozzles and injectors. The small, versatile tool can also be used for testing valves, castings, hydraulic controls, brakes, radial engine injectors, presses and other items in industrial use. *The Buda Co.*

IT'S NEW ✓ CHECK IT

(27) NEW MULTIPLE V-BELT DRIVE booklet entitled, "How the Dominant Drive Speeds Production," presents results in terms of operating advantages to the user. Delivered horsepower, drive durability, adaptability to fluctuating production schedules, and many other features for the layman are included. *Multiple V-Belt Drive Association.*

IT'S NEW ✓ CHECK IT

(28) PACKING CATALOG includes a complete description with illustration of all the various types and styles of packings. Also contains five pages of charts showing the type of service each style packing is recommended for. *Raybestos-Manhattan, Inc.*

IT'S NEW ✓ CHECK IT

(29) CORROSION RESISTANCE for all metal surfaces is contained in new booklet on substance known as "TK-2" used for prevention of corrosion in pipe lines, valves, production equipment, tubing, sucker rods, pumping stations, and in galvanizing plants. Called a thermosetting plastic coating by the manufacturer. *Tube-Kote, Inc.*

IT'S NEW ✓ CHECK IT

(30) IMPORTANCE OF THERMOTECHNIC INSTRUMENTS is discussed in new illustrated pamphlet entitled, "What Thermotechnics Means to You." Booklet will enable engineers and other key men in the oil industry to obtain the fundamentals of thermotechnic devices. Can be used in refinery laboratories and instrumentation application. *Fenwal, Inc.*

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REFINING

Indiana Standard Building New Units

CHICAGO. — Three huge fluid catalytic cracking units are being constructed by Standard Oil Co. (Ind.), each of 25,000-bbl. per day capacity for cracking gas oil. Two of the units are at Whiting, Ind., and one at Sugar Creek, Mo. The program will be completed by W. M. Kellogg Co. early in 1947. Vapor recovery units for each catalytic unit are being built by Foster Wheeler Corp. to handle the entire light-vapor output of each unit.

These units incorporate the most recent developments in catalytic cracking. Catalyst - to - oil ratio will be 6.8 to 1 in the reactor. Regenerator temperatures will be controlled at about 1,025° F. by recirculating cold catalyst.

Some idea of the care being exercised in equipment construction is given from the fact that all welds are X-rayed before release of the item for inclusion in the units. Two elevators are provided for each unit. Adequate blowdowns are also provided along with flares as safety measures. The vapor recovery units may be converted to propane-propylene recovery if desired. An intensive personnel training program is being carried out to provide adequately qualified operating crews which now are studying the operation of the vapor recovery and cracking units.

Penn Crude Runs Gain

Runs to stills of Pennsylvania crude oil rose sharply in the week ended June 22 to a total of 444,358 bbl., a daily average of 63,480 bbl. This was an increase of 50,211 bbl. total over the previous week's runs of 394,147 bbl. Runs to stills in the week ended June 8 totaled 412,492 bbl., according to the National Petroleum Association.

Michigan Plant to Close Because of Lack of Crude

MT. PLEASANT, Mich. — Because of the inability to obtain an adequate supply of crude, Mid-West Refineries, Inc., is closing its refinery at Grandville, Mich.

Company officials disclosed last week that negotiations are under way to sell the entire plant to an unnamed company at Mobile, Ala. The Grandville plant has a listed capacity of 4,500 bbl. daily crude and 2,000 bbl. daily cracking. It was built in 1939.

Mid-West will continue to operate its Alma, Mich., refinery. This plant has a capacity of 3,500 bbl. daily crude and 1,750 bbl. daily cracking.

Mid-West is the second refining company to announce closing of a plant in recent weeks because of insufficient crude supplies. In Oil City, Pa., early in June, Continental Refining Co. officials said the plant there would be dismantled in view of the lack of supplies of Pennsylvania-grade crude.

Bareco to Discontinue Processing at Barnsdall

Bareco Oil Co. last week disclosed plans to discontinue crude-oil processing at its Barnsdall, Okla., refinery and to operate the plant solely as a microcrystalline wax-manufacturing unit.

The crude gathering and pipe-line system in Oklahoma will continue to be operated without interruption in service to lease connections, accounting, and payment procedure. Crude now being refined at Barnsdall will be transferred to the company's Wichita, Kans., refinery, where throughput will be materially increased.

Wartime developments in petroleum refining have resulted in a competitive situation which makes it desirable to install new equipment in order to produce higher-octane gasoline as well as improved diesel and domestic burner fuels, said O. L. Cordell, company president. It would not be feasible to make such im-

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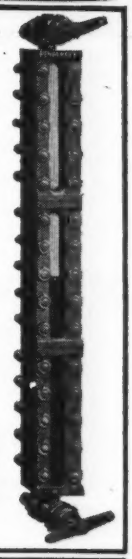
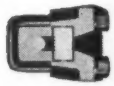
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provements at both the Barnsdall and Wichita plants, and it has been decided that, as soon as necessary arrangements can be made, crude-oil operations at Barnsdall will cease and be consolidated with those at the Wichita plant, he said.

Bareco's Wichita refinery has a crude capacity of 6,000 bbl. daily with 3,250 bbl. daily cracking capacity. The Barnsdall refinery has a capacity of 3,500 bbl. daily crude, and 2,250 bbl. daily cracking.

The same reasons—wartime refining technological developments—were given by Standard Oil Co. (Ind.) late in May in announcing that it will close its refineries at Neodesha, Kans., and Greybull, Wyo., sometime in 1948. Indiana Standard said engineering studies show it would be an uneconomical duplication to install catalytic cracking facilities at the plants.

Gulf Coast Runs Reported At 82 Per Cent of Capacity

HOUSTON.—The Gulf Coast Refiners Association reporting on operations of member refineries on the Texas Gulf Coast for the last half of June indicates crude runs to stills totalling 136,333 bbl. daily, which is at the rate of 86.2 per cent of the rated 158,000 bbl. a day operating capacity. The plants were at 92 per cent capacity the first half of June.

Stocks of all grades of gasoline and naphthas decreased during the last half of June by 36,903 bbl. and were reported at 2,167,677 bbl. A year ago total gasoline stocks were 1,812,708 bbl. Automotive gasoline stocks considered alone were 1,426,543 bbl. July 1, showing a decrease of 117,973 bbl.

Kerosene stocks at 305,994 bbl. July 1 indicate a decrease of 31,209 bbl. during the period. Diesel gas oil stocks July 1 were 157,000 bbl., reflecting an increase of 86,869 bbl. Stocks of other grades of gas oil increased 109,707 bbl. to 1,005,062 bbl. during the period. Stocks of No. 5 fuel oil decreased 51,775 bbl. to 192,267 bbl., and Bunker C fuel oil increased 8,354 bbl. to 289,865 bbl. July 1.

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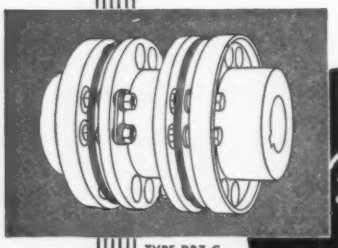

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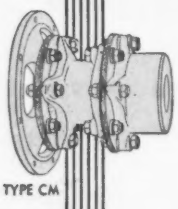

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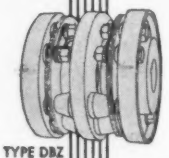

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Rubber Scarce, Butadiene Production Continues High

WASHINGTON.—Rubber will continue scarce over the balance of this year, John Small, Civilian Production Administration chief, said last week, and continued production of petroleum butadiene at maximum capacity for many months is necessary.

The return of molasses and grains to food use instead of industrial alcohol has slowed the production of general-purpose synthetic rubber, Small said.

CPA officials, while viewing the situation as temporary, ordered an additional 12,000 long tons of natural rubber from the national reserves channeled into industry during the balance of the year to supplant synthetic rubber.

Oklahoma Refinery Is Damaged by Fire

OKLAHOMA CITY. — Reconstruction has begun at the Cyril, Okla., refinery of Anderson-Prichard Oil Corp. which was damaged by fire last week. Damage was reported confined to the asphalt roofing and specialty equipment.

The main refinery unit is in operation. Crude oil supply is from the nearby Cement area of Caddo County.

New Aviation Fuels Listed

NEW YORK.—Socony-Vacuum Oil Co., Inc., is preparing to market three commercial grades of aviation gasoline from coast to coast. Included are an 80-octane clear unleaded fuel, which replaces both the 73 and 80-octane aviation gasolines containing tetraethyl lead; a 91-octane; and a 100-octane fuel. Both the 91 and the 100-octane fuels have lower lead content than that used in similar wartime aviation gasolines, the company said.

PIPE LINES

Oklahoma Commission Will Support FPC Applications

The Oklahoma Corporation Commission will support applications for two natural-gas pipe lines from the three-state Hugoton gas field to northern terminals, a commission official said last week.

The applications, now before the Federal Power Commission, are those of Mid-Continent Natural Gas Transmission Co. for a proposed line from the Kansas sector of the field to the Mesaba iron range of northeastern Minnesota, and the Michigan-Wisconsin Pipe Line Co. for a line to the Detroit area.

Price Given Contract on Indiana Standard Line

BARTLESVILLE, Okla.—Standard Oil Co. (Ind.) has awarded a contract to H. C. Price Co. here to build the principal river crossings on its new 629-mile products line from the Whiting, Ind., refinery.

Price also will lay more than 240 miles of the carrier. The 8, 10, and 12-in. line will extend into Illinois, Iowa, and Minnesota, serving Rockford, Ill.; Dubuque, Iowa; Minneapolis, St. Paul, and Rochester, Minn. Work is scheduled to start by mid-August and is due for completion by October 15.

FPC Authorizes 70-Mile Gas Line in Kentucky

WASHINGTON. — Cincinnati Gas Transportation Co., Charleston, W. Va., has been authorized by the Federal Power Commission to construct approximately 70 miles of 14-in. natural-gas pipe line extending from a point on its main transmission line near Foster, Ky., to a proposed interconnection with Tennessee Gas & Transmission Co.'s 24-in. pipe line near Means, Ky.

The new line was authorized to increase deliveries to meet requirements of Cincinnati Gas & Electric Co. which serves Cincinnati and other communities in southern Ohio, and Union Light, Heat & Power Co. which serves Covington, Newport, and other northern Kentucky communities. Cost of the line is estimated to be $1,800,000. Completion of construction is expected by November 1.

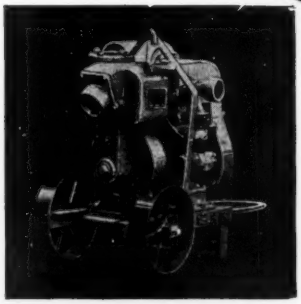
The new pipe line will afford Cincinnati Gas Transportation an additional 50,000,000 cu. ft. daily for delivery to Cincinnati Gas & Electric and Union Light, Heat & Power, according to the company's application. The gas will be supplied by Tennessee Gas & Fuel Gas Co., which sells Cincinnati Transmission for the account of United Gas Transportation Co. its entire gas supplies.

Kentucky Natural to Build 18-Mile Natural-Gas Line

WASHINGTON.—Kentucky Natural Gas Corp., Owensboro, Ky., has been authorized to construct and operate approximately 18 miles of 10¾-in. natural-gas transmission pipe line extending from the vicinity of Russellville, Ky., to near Mitchellville, Tenn., the Federal Power Commission announced last week.

The line is to be utilized to receive a supply of gas from Tennessee Gas & Transmission Co. under a contract by which that company agreed to supply

PIPE LINE SUPPLIES AND EQUIPMENT



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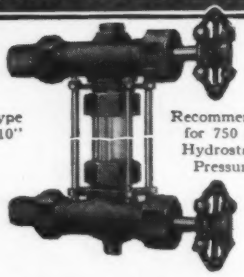

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

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Kentucky Natural up to 60,000 therms of natural gas per day upon the issuance of a certificate of public convenience and necessity to Tennessee Gas & Transmission for the purchase from Reconstruction Finance Corp. of four compressor stations located in Washington County, Mississippi, Hardeman and Robertson counties, Tennessee, and Montgomery County, Kentucky. The authorization was granted Tennessee Gas & Transmission by FPC on June 18. The facilities to be constructed by Kentucky Natural are estimated to cost $213,840.

United Gas Authorized To Construct Additions

WASHINGTON.—United Gas Pipe Line Co., Shreveport, has been granted authorization to construct additions in Mississippi and Louisiana to its main pipe-line system which serves industrial and wholesale customers in Louisiana, Texas, Mississippi, Alabama, and Florida. Cost of the authorized facilities together with necessary field facilities is estimated to be $2,277,000.

Facilities authorized include construction of extensions from Baxterville and Gwinville gas fields in Mississippi and Hayes gas field in Louisiana to the company's main transmission line, installation of 850-hp. compressor capacity at United's Iowa, La., compressor station, relocation of a 1,000-hp. compressor unit from its Magasco compressor station in Texas to its Hattiesburg, Miss., compressor station, construction of a 3-mile extension to its existing Laurel loop line in Jones County, Mississippi, a 1-mile extension to Richton, Miss., and other facilities.

Under contracts made with Gulf Refining Co., United estimates it will purchase about 7,200,000,000 cu. ft. annually from Hayes field, 10,000,000,000 cu. ft. from Baxterville field and 14,000,000,000 cu. ft. from Gwinville field.

Southern Natural Expansion Program Given Approval

WASHINGTON.—A $2,608,200 construction program planned by Southern Natural Gas Co., Birmingham, Ala., and including 87 miles of natural gas pipe line, was approved by the Federal Power Commission last week.

The commission authorized Southern Natural to construct and operate about 80 miles of 16-in. line from Pickens, Miss., to Gwinville gas field in Jefferson Davis and Simpson counties, Mississippi, and about 7 miles of 6-in. line near Tallageda, Ala. Southern Natural has entered into a 20-year contract with Superior Oil Co. to buy gas in Gwinville field.

Also approved was the installation of meters and other facilities to tap the company's lines at points of connection with lines to be constructed by the town of Ragland, Ala., the city of Sylacauga, Ala., Alabama Gas Co., Alabama Natural Gas Corp., Birmingham Gas Co., and Atlanta Gas Light Co.

Automatic Regulating Valve Recommendation Available

WASHINGTON.—Printed copies of Simplified Practice Recommendation R219-46, Automatic Regulating Valves, are now available, according to an announcement of the division of simplified practice of the National Bureau of Standards.

The purpose of the recommendation is to establish as a useful standard of practice a simplified list of pressure ratings and sizes of seven types of these valves, made of steel, iron and bronze. The recommendation was developed by a simplified practice committee of manufacturers in cooperation with the division of simplified practice. It will retain on a voluntary basis certain of the simplified practice features of a mandatory order which was effective during the war emergency. Printed copies may be obtained from the superintendent of documents, Government Printing Office, Washington 25, D. C., for 5 cents each.

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Natural Gas

FPC's Policies Threaten New Capital, Irelan Says

OKLAHOMA CITY. — Continued application of the Federal Power Commission's "standards of measurements" to the natural-gas industry threaten to make it increasingly difficult to attract the new capital necessary to maintain reserves and assure continued growth, S. B. Irelan, president of Cities Service Gas Co., asserted last week.

While conceding the need for some degree of regulation of the industry, Irelan in a talk before the Engineers Club of Oklahoma City said a study of the legislative history of the federal natural-gas act "is convincing that Congress did not intend the use of all of the specific standards adopted by the commission and the inclusion of the natural-gas business in the same category of regulations as a public utility."

Irelan mentioned the commission's system of cost accounting using the original cost of each particular item of property; its adoption of depreciated original cost of facilities as a measure of the rate base; its method of measuring depreciation by considering the individual age-life of each particular type and class of property on a straight-line basis; and its allowance of from 6 to 6½ per cent as a measure of fair return.

"In the case of interstate natural-gas companies, these yardsticks of depreciated original cost and of return also have been applied to gas reserves," he said. "Whether natural gas is produced by individuals, regulated corporations, or unregulated corporations, all should be allowed the going market value of the commodity as fixed by competitive arms-length dealing; otherwise risk capital will not be attracted for the exploration and discovery of new reserves. . . ."

As an example of FPC's "aboriginal-rate" rule, Irelan cited the company's 68,000-acre Waggoner lease in the Texas Panhandle, now yielding 130,000,000 cu. ft. of gas daily. It is, he said, valued at zero for rate making. Another inequity, he continued, is the price paid for gas in the field. The company is allowed a price of only 1.75 per thousand for the gas it produces, but is forced to pay royalty on the basis of the field prices—4 to 5 cents per 1,000 cu. ft. in the Guymon-Hugoton field.

"To be fair to the investor, the gas industry should be permitted to earn 6.5 per cent on present costs and values, not of the aboriginal cost; in other words, figure the value of New York City at its present worth and not what the Dutch paid the Indians for Manhattan Island."

"Some decisions of the Federal Power Commission, and of the courts, indicate that the price of natural gas produced by individuals or companies that do not transport natural gas in interstate commerce may be subjected to regulation by that commission," he said. "This situation has undoubtedly deterred oil companies and other nonregulated producers of natural gas in exploring for, developing, and selling natural gas which ultimately would be transported to markets by interstate companies."

Lone Star Gets Loan For Extension Program

DALLAS.—Plans for expansion of present facilities and further development of resources were made known last week when Lone Star Gas Co. borrowed $18,000,000 from Pittsburgh and Texas banks.

The funds include some $3,700,000 to be used for extensions to the company's distribution system. Another $1,250,000 will be used to acquire an interest in Shell Oil Co., Inc.'s cycling plant in Sheridan field of Colorado County, Texas.

A fund of $1,250,000 was earmarked for development of production properties in Henderson County, Texas. Balance of the loan is to be used in taking up outstanding notes and the major portion of the customer deposits with the company, upon which interest is paid.

FPC Accepts New Rates Of Canadian River Gas

WASHINGTON. — Rate schedules reducing by not less than $551,000 the charges for natural gas sold by Canadian River Gas Co. to Colorado Interstate Gas Co. have been accepted for filing by the Federal Power Commission as complying with its order of March 18, 1942, as amended by an order of April 22, 1942.

The filing of the rate schedules has been delayed by Canadian River's appeal of the orders in the courts.

Natural Gasoline

N.G.A.A. Reports Rise in Natural Gasoline Output

Total natural gasoline production in the Mid-Continent and Texas Gulf Coast areas rose 3.3 per cent in May over April, according to the monthly report of the Natural Gasoline Association of America.

Production of all grades of gasoline in May was 121,478,394 gal. (equivalent to 143,671,569 gal. of 26-70 grade), an increase of 3,833,438 gal. over April's production of 117,644,956 gal. May daily average was 3,918,657 gal. Total production of 26-70-grade gasoline in May was 37,203,614 gal., a gain of 237,874 gal. over the previous month.

Illinois plants reported the greatest gain in May, with a total production of 3,649,359 gal. of all grades, up 1,306,922 gal. over April, or 55.8 per cent.

A general increase was shown throughout Texas, with the exception of North Texas, which remained on the same production level as April. Total production was 78,224,-982 gal., an increase of 4,741,786 gal., or 6.5 per cent for the month. Equivalent production of 26-70 grade in May was 91,146,830 gal.

Oklahoma production totaled 19,-836,577 gal. in May, a decline of 4.5 per cent in comparison with 20,762,-148 gal. in April.

Other areas showed little change in May production, with the following reported: Kansas, 4,878,249 gal.; Arkansas, 3,300,573 gal.; Louisiana, 7,-474,601 gal.; and New Mexico, 4,114,-053 gal.

New Company Planning Kansas Gasoline Plant

WICHITA, Kans.—Deerfield Petroleum, Inc., a newly formed company, has filed application with the Kansas Corporation Commission for permission to construct an absorption-type gasoline extraction plant near Deerfield, in Kearney County, Kansas.

The plant is expected to cost $66,000 to $100,000 and will have an estimated capacity of 50,000,000 to 60,000,000 cu. ft. of gas daily. The company has made tentative arrangements with Kansas-Nebraska Pipe Line Co., Inc., for a supply of gas. President of the new company is F. Conner Creigh. Treasurer is Thomas Creigh, Jr., and vice president and secretary is Edward S. Newton. Thomas Creigh and Newton formerly were associated with Northern Natural Gas Corp.

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 13, 1946

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	30	15	0	†15	41,512	836	719	0	0	0	0	0	0	0	0	0	0
Pennsylvania	76	37	9	‡30	119,191	2,129	2,062	0	0	0	0	0	0	0	0	0	0
West Virginia	22	5	12	5	53,045	373	427	0	0	0	0	0	0	0	0	0	0
Ohio	16	2	6	8	51,419	620	468	0	0	0	1	1	2	0	10	20	32
Indiana	7	4	0	3	17,758	180	99	0	0	0	1	1	2	0	0	10	12
Kentucky	10	3	4	3	15,410	248	243	0	0	0	0	0	2	0	0	20	22
Illinois	52	31	0	21	137,807	1,148	888	1	0	0	10	11	23	0	0	201	224
Michigan	19	7	0	12	48,945	421	404	3	0	0	5	8	15	0	5	136	156
Kansas	39	20	8	11	123,038	1,040	884	0	0	0	4	4	15	0	0	131	146
Neb., Mo., Iowa	0	0	0	0	0	9	12	0	0	0	0	0	0	0	0	5	5
Oklahoma	52	24	12	*16	198,131	1,278	1,296	1	0	2	7	10	43	0	23	157	223
Texas	143	77	13	53	607,827	4,240	3,837	2	0	2	26	30	102	18	16	680	816
North Central	72	33	2	37	195,209	1,542	1,134	0	0	1	19	20	28	0	2	285	315
West	21	16	0	5	132,839	880	990	2	0	0	2	4	29	0	1	88	118
Panhandle	5	1	3	1	15,066	182	297	0	0	0	0	0	0	0	0	5	5
Eastern	9	5	4	0	53,464	388	174	0	0	0	0	0	10	0	1	49	60
Gulf Coast	29	21	4	4	186,109	939	877	0	0	1	2	3	24	16	7	139	186
Southwest	7	1	0	6	25,140	309	365	0	0	0	3	3	11	2	5	114	132
Louisiana	18	10	0	8	114,302	684	536	0	0	0	5	5	32	5	4	88	129
Northern	12	8	0	4	53,221	375	192	0	0	0	1	1	6	0	0	48	54
Southern	6	2	0	4	61,081	309	344	0	0	0	4	4	26	5	4	40	75
Arkansas	1	1	0	0	5,630	97	94	0	0	0	0	0	4	0	0	20	24
Mississippi	0	0	0	0	0	138	187	0	0	0	0	0	1	0	1	39	41
Southeastern States	0	0	0	0	0	23	30	0	0	0	0	0	0	0	0	20	20
Montana	3	3	0	1	8,099	151	165	0	0	0	1	1	9	0	0	17	26
Wyoming	4	4	0	0	24,265	88	100	1	0	0	0	1	9	0	3	22	34
Colorado-Utah	3	2	0	1	14,354	70	19	0	0	0	1	1	3	0	0	9	12
New Mexico	4	2	2	0	12,551	191	234	0	0	0	0	0	3	0	0	23	26
California	36	30	2	4	164,774	967	1,242	1	0	0	3	4	5	0	2	115	122
Total United States	536	277	68	191	1,758,058	14,931	13,946	9	0	4	64	77	270	23	64	1,713	2,070
Total previous week	531	305	34	192	1,532,863	14,395	13,362	17	0	2	71	90	261	23	60	1,649	1,993
Total July 14, 1945	519	315	69	207	1,880,079			5	3	4	70	82	283	13	72	1,793	2,161

Service wells included: *1, †15, ‡29.

MARKET QUOTATIONS

(Quotations shown here are f.o.b. plant in tank cars and in cents per gal. as of last Monday.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-78½†	73-75
Mid-Continent*	6.750	6.000
Texas Gulf Coast	6.375	5.750
New York Harbor	7.700	6.800
California		6.00-6.875

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.500	4.200
N. Texas (f.o.b. plant)	3.000	3.600
N. Louisiana (f.o.b. plant)	3.375	4.050
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.

East Texas	$1.35
Conroe	1.53
Tepetate, Louisiana, avg. grav.	1.30
Illinois Basin	1.47
Pecos County, Texas	1.05
Bradford, Pennsylvania	3.10
Van, Van Zandt County, Texas	1.18

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$1.03	....	....	....
19-19.9	1.03	....	$1.16	$0.80
20-20.9	1.03	$0.95	1.18	.82
21-21.9	1.03	.97	1.20	.84
22-22.9	1.06	.99	1.22	.86
23-23.9	1.10	1.01	1.24	.88
24-24.9	1.13	1.03	1.26	.90
25-25.9	1.17	1.05	1.28	.92
26-26.9	1.21	1.07	1.30	.94
27-27.9	1.25	1.09	1.32	.96
28-28.9	1.28	1.11	1.34	.98
29-29.9	1.30	1.13	1.36	1.00
30-30.9	1.33	1.15	1.38	1.02
31-31.9	....	1.17	1.40	1.04
32-32.9	....	1.19	1.42	1.06
33-33.9	....	1.21	1.44	1.08
34-34.9	....	1.23	1.46	1.10
35-35.9	....	1.25	1.48	1.12
36-36.9	....	1.27	1.50	1.14
37-37.9	....	1.29	1.52	1.16
38-38.9	....	1.31	1.54	1.18
39-39.9	....	1.33	1.56	1.20
40 and above	....	1.35	1.58	1.22

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended July 6, 1946

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks—Gaso-line	Stocks—Dis-tillate	Stocks—Resid-ual
East Coast	808	22,873	12,161	9,191
Appalachian	142	3,407	569	390
Ill., Ind., Ky.	768	17,925	5,562	4,037
Okla., Kans., Mo.	377	8,000	2,433	1,367
Inland Texas	230	2,945	410	701
Tex. Gulf Cst.	1,206	14,457	6,400	5,034
La. Gulf Coast	353	4,093	2,059	1,428
N. La., Ark.	59	1,822	392	163
Rocky Mtn.	145	2,012	530	787
California	787	14,178	8,878	24,645
Total 7- 6-46	4,875	91,712	39,394	47,743
Total 6-29-46	4,854	92,333	37,762	46,447
Total 7- 7-45	5,036	86,141	33,657	40,965

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
June 29, 1946	223,883,000
June 22, 1946	222,193,000
June 30, 1945	220,781,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	July 13 crude oil	B. of M. July demand	July 6 crude oil
Alabama	1,200	950	1,200
Arkansas	79,800	78,000	78,800
California	876,250	844,000	878,250
Colorado	30,110	28,000	29,960
Eastern	64,500	64,000	67,500
Florida	200	250	350
Illinois	208,350	210,000	211,350
Indiana	18,300	19,000	19,800
Kansas	271,750	260,000	254,750
Kentucky	31,150	31,000	31,350
Louisiana	389,850	380,000	389,800
North Louisiana	89,200	.....	89,150
South Louisiana	300,650	.....	300,650
Michigan	50,810	47,000	47,750
Mississippi	67,000	60,000	63 300
Montana	26,490	22,000	25,680
Nebraska	750	800	800
New Mexico	98,150	97,000	98,150
Oklahoma	384,850	384,000	383,350
Texas	2,227,550	2,110,000	2,227,550
Dist. 1 (Southwest)	19,500	.....	19,500
Dist. 2 (Southwest)	158,100	.....	158,100
Dist. 4 (Southwest)	228,000	.....	228,000
Dist. 3 (Gulf Coast)	511,350	.....	511,350
Dist. 5 (Eastern)	44,150	.....	44,150
Dist. 6 (Eastern)	107,800	.....	107,800
East Texas Field	315,000	.....	315,000
Dist. 7C (West)	28,000	.....	28 000
Dist. 8 (West)	569,150	.....	569,150
Dist. 7B (W. Central)	32,000	.....	32,000
Dist. 9 (N. Central)	129,300	.....	129,300
Dist. 10 (Panhandle)	85,200	.....	85,200
Wyoming	106,700	112,000	109,430
Total United States	*4,933,760	4,748,000	4,919,120
Change from prev. wk., up	14,640		

Total production January 1-July 13 ..... †910,837,379 bbl.
Same period last year (crude, plus condensate) . 932,019,050 bbl.
*Not incl. 21,500 bbl. condensate. †Incl. 4,909,400 bbl. condensate.

CRUDE-OIL STOCKS 223,883,000 bbl. as of June 29—up 1,690,000 bbl. One year ago 220,781,000 bbl.

GASOLINE STOCKS 91,712,000 bbl. as of July 6—down 621,000 bbl. One year ago 86,141,000 bbl.

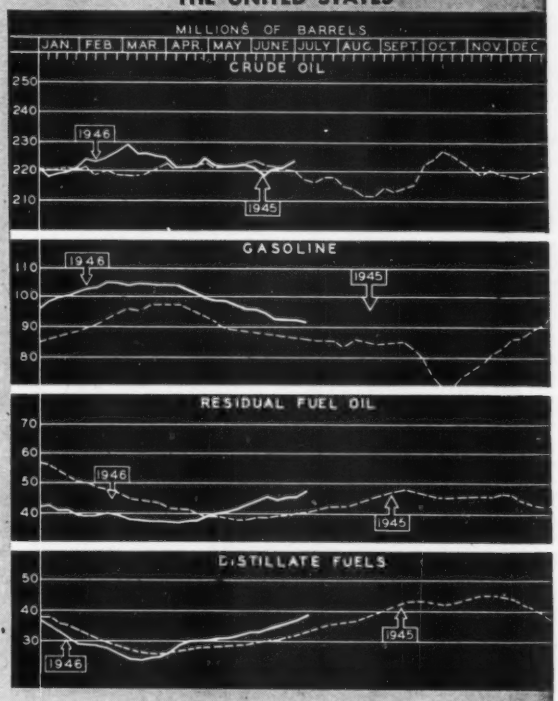
RESIDUAL FUEL-OIL STOCKS 47,743,000 bbl. as of July 6—up 1,296,000 bbl. One year ago 40,965,000 bbl.

GAS OIL AND DISTILLATE STOCKS 39,394,000 bbl. as of July 6—up 1,632,000 bbl. One year ago 33,657,000 bbl.

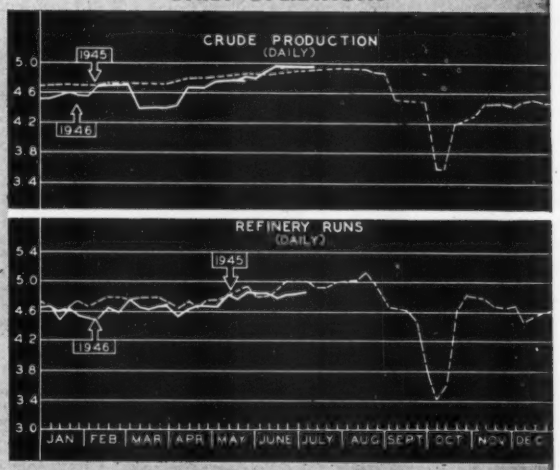
CRUDE-OIL PRODUCTION 4,933,760 bbl. as of July 13—up 14,640 bbl. One year ago 4,936,950 bbl.

REFINERY RUNS 4,875,000 bbl. daily week ended July 6—up 21,000 bbl. One year ago 5,036,000 bbl.

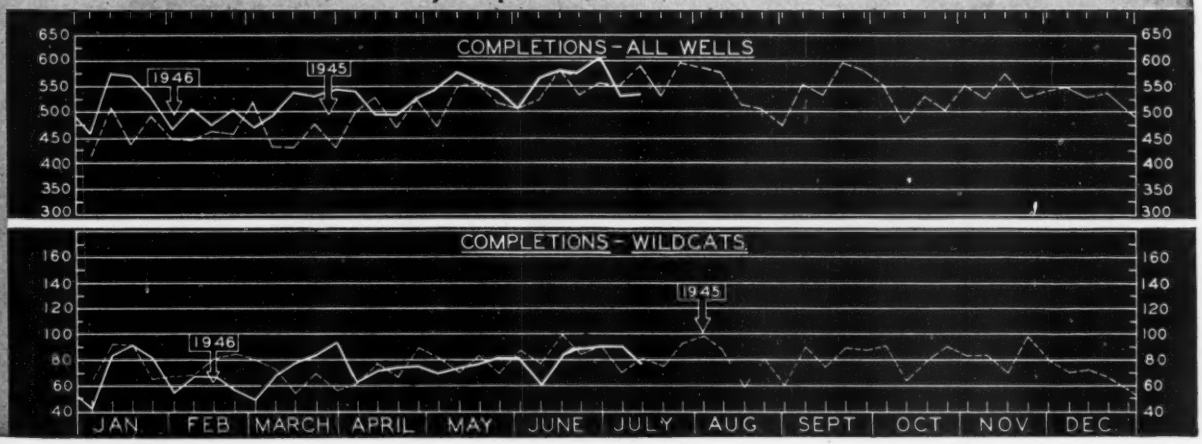
OIL STOCKS IN THE UNITED STATES

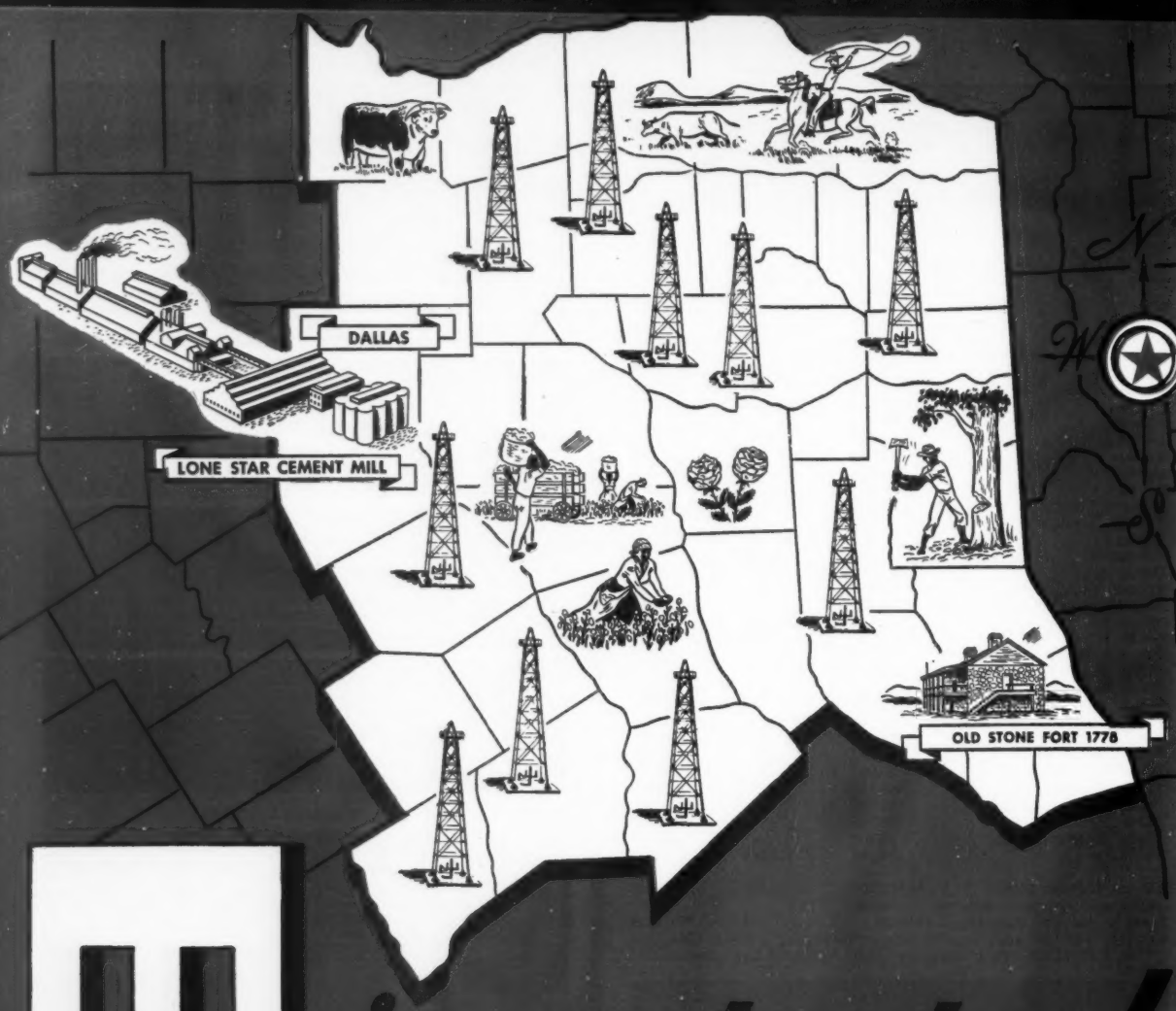


DAILY OPERATIONS



Solid line charts weekly completions, service wells in Eastern area included





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Exploration and Drilling

The Search for Strat Traps

IN the midst of the greatest wildcatting campaign in history, the search for stratigraphic-trap fields is getting its proportionate share of attention. The discovery of West Edmond gave new stimulus to this phase, and developments in the Delhi area of North Louisiana, and around the north end of Cut Bank in Montana have certainly not put any damper on it.

Therefore the announcement of a location for a test in the north end of the Tyler, or East Texas basin will direct a certain amount of attention in that direction. The test, H. W. Snowden et al 1 Morgan, SE SE SE 25-9s-25e, is actually located across the line in southeastern Oklahoma, about 15 miles southeast of the town of Idabel, in McCurtain County.

The play here is to try the Cretaceous overlap, which going north, pinches out against the main Ouachita Mountain uplift, and it is believed that about a 3,000-ft. test will catch the basement rocks. (See "Possible Future Oil Provinces of the United States," A.A.P.G., p. 92). The dominant regional tectonic features are the southwest spur of the main Ouachita uplift, which plunges beneath the Cretaceous in about a south-southwest trend, and farther south, in Texas, the Balcones fault.

The test lies between the Uplift and the Balcones fault, and should throw some light on the problems of reservoir and source beds in this part of the Cretaceous.

At best the search for stratigraphic trap fields is a hazardous one; at its worst it can be extremely expensive and a very long shot. About the best the geologists can do is decide where a regional pinchout exists, then drill enough wells to find out whether there is a good marine section for source beds, and good sands or porous limes for reservoir beds.

If indications are found that the area has the earmarks of a petroliferous region, namely oil and gas shows, or oil on structure in the same general area; and if the stratigraphy indicates that good reservoir beds are available near the pinchout, then the problem boils itself down to one of drilling enough wells to find a field. Barring unusually good luck, this can be very expensive, with the major factor the depth of the wells, since drilling costs tend to rise geometrically with increased depth.

Little wonder then that some geologists, in their wishful moments, hope someone will hurry up and develop a direct method of finding oil in place, instead of the present indirect method of looking for and testing structural and stratigraphic traps. Also little wonder that despairing of that development, many say they would settle for a method of drilling 10,000 ft. at $1.50 per foot, and that if they had that, they would find as much oil as if they had a method of locating oil directly in place.

SOUTH LOUISIANA

St. Landry Parish Wildcat Has Large Flow of Dry Gas

NEW ORLEANS.—Sun Oil Co. 1 Darby, 6-8s-4e, a wildcat test south of the Shuteston field, St. Landry Parish, is flowing dry gas through a 7/64-in. choke. Drilled to a total depth of 10,130 ft. the 7-in. casing was cemented on bottom, and perforated with 88 shots from 9,965-85 ft. Flowing pressure of the gas is 3,650 lb. through a 7/64-in. choke. This is a different sand level than at any productive level in the Shuteston field.

The second producer for the Singer pool of Beauregard Parish has been completed. Magnolia Petroleum Co. 2-C Lutcher-Moore Lumber Co., in 25-5s-11w, flowed 130 bbl. of pipe-line oil on a 24-hour gage through a 7/64-in. choke with 1,100 lb. flowing pressure on the tubing. Total depth is 8,132 ft. and 5½-in. casing is set to 7,724 ft. This well is completed in the discovery sands encountered from 7,638-48 ft.

Avoyelles Petroleum Corp. 1 R. E. Bordelon, wildcat test in the Marksville area, 56-2n-4e, has been completed as a dry hole. On a test in the Wilcox at 7,917 ft., the well flowed a gage of 500 bbl. of fluid, 15 per cent of which was a good grade of 43°-gravity oil, through a ¼-in. choke, tubing pressure 200 lb. The oil ratio dropped to 4 per cent and pressure dropped to zero. Other tests were made in the Sparta sand section which were reported to have shown oil from 4,601-10 ft., however drill-stem recoveries showed 100 per cent salt water.

Magnolia Petroleum Co. continues wide exploration activities in the South Louisiana district. The 1 T. Reed Estate, approximately 2 miles southwest of Mamou townsite, and 4 miles southwest of the Mamou field discovery well in Evangeline Parish, is scheduled to be drilled to 13,500 ft. Company tools will be used, and roads are now being built to the location.

Four of the 6 completions reported this week were dry wildcats, one each in Acadia, Cameron, Jefferson Davis, and Lafourche parishes, while the two producers were in proven fields, one each in Bayou Perot field in Jefferson Parish, and in Bon Air field in Jefferson Davis Parish. Calcasieu Parish received the greatest activity this week reporting four new locations with Evangeline Parish next with three. Three wildcat locations were reported, two in Calcasieu and one in Evangeline parishes.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Harry Fotiades 1 J. R. Watson, 24-7s-1e, 1 mi. N of South Bayou Mallet production, dry, TD 10,004 ft.

Cameron Parish: Continental 4 State-Calcasieu Lake, 1-14s-9w, in Calcasieu Lake, dry, TD 13,037 ft.

Jefferson Davis Parish: Sohio Petroleum Co. 1-A W. L. Trimble, 2-8s-4w, dry, TD 9,598 ft.

Lafourche Parish: Union Oil of Calif. 1 City of New Orleans, 24-23s-22e, dry, TD 9,174 ft.

TEXAS GULF COAST

Hamel Field Outpost Has High Condensate Potential

HOUSTON.—Outpost test at Hamel field in Colorado County, Skelly Oil Co. 2 Berthold, in Richard Dowdy Survey, flowed a potential gage of 191 bbl. of 53°-gravity condensate daily through a 7/32-in. choke with 2,400 lb. flowing pressure on the tubing and a gas ratio of 10,554 to 1, and no water. Total depth is 9,211 ft., with top of sand at 9,032 ft. Production is through 71 perforations at 9,059-70 ft.

Also in Colorado County, Cities Service Oil Co. 1 G. F. Krider, a 3,000-ft. southeast extension test to production at Ramsey field, in Peter K. Bartlesson Survey, flowed on initial gage 3,959,000 cu. ft. of gas and 120 bbl. of 56°-gravity straw-colored condensate with 1,400 lb. flowing pressure on the tubing and 2,950 lb. shut-in pressure. Drilled to a total depth of 9,598 ft., with 5½-in. casing set at 9,205 ft., production is through perforations at 8,662-73 ft.

West Production Co. and Noranda Oil Co. 1 H. M. Boring, wildcat discovery well 7½ miles southwest of Madisonville in Madison County, in Amy Boatright Survey, flowed 3 to 5 million cubic feet of gas daily through a ¼-in. choke with 2,450 lb. flowing pressure and a shut-in pressure of 3,800 lb. through perforations at 11,815-865 ft. These perforations will be squeezed and further tests will be made up the hole. Total depth is 12,536 ft. and 5-in. liner is cemented to 12,316 ft.

Moore & Ahern 1 E. A. Clement et al, east extension gas well at Texana field, Jackson County, gaged 3,032,000 cu. ft. of gas per day through a ¼-in. choke, with 2,055 lb. tubing pressure, with an estimated open flow potential of 47,000,000 cu. ft. per day, shut-in pressure 2,130 lb., through perforations at 5,595-5,604 ft. Total depth is 6,823 ft., with 5½-in. casing set to 5,660 ft. This well is 3,300 ft. southeast of the 1-A Geo. W. Clement et al gas well, and is in the S. F. Austin 2-league grant.

Pan American Production Co. 1 Callihan Unit, a wildcat test in the Liverpool area

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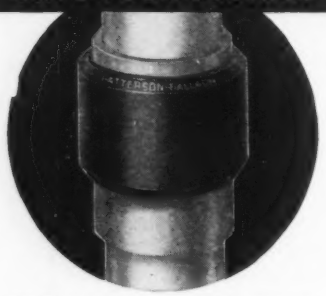

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of Brazoria County, is plugging back and will set 5½-in. production string for a test. Total depth is 11,840 ft. and 7-in. protection casing has been set to 11,615 ft. An electric log to 11,615 ft. indicated some shows near the bottom.

Twenty-two new locations were reported this week, 6 being wildcats, 2 each in Chambers and Fort Bend counties, and 1 each in Matagorda and Wharton counties. Fort Bend County took the lead with seven locations, Jackson next with four, and Brazoria and Matagorda each received three. Only one wildcat was completed this week and it was a dry hole in Harris County. Brazoria County received two producers while Chambers, Colorado, Hardin, Jackson, Jefferson, Matagorda, and Polk counties each received only one producer.

TEXAS GULF COAST WILDCAT FAILURE

Harris County: Jack W. Frazier 1 R. J. Weis, in W. M. Waters Sur., 4½ mi. NW of Fairbanks production and 2 mi. N of Satsuma townsite, dry, TD 7,816 ft.

SOUTHWEST TEXAS

Starr County Wildcat Opens New Oil Field

CORPUS CHRISTI.—A new oil field has been opened in Starr County by Sun Oil Co. 1 Lee M. Green, located 2 miles northeast of the Sun field. Drilled to a total depth of 9,895 ft., hole was plugged back inside the 9⅝-in. casing, which previously had been set to 5,000 ft., and the casing was perforated at 4,729-30 ft. The well flowed 16 bbl. of 48°-gravity oil in 5 hours with gas-oil ratio of 1,010 to 1.

Reklaw sand production has been opened by H. R. Smith and Skinner & Eddy Corp. in 1 C. F. Weigang, in the A. S. Donovan Survey, in extreme east corner of Atascosa County. It flowed a potential gage of 170 bbl. of 24°-gravity oil per day through a 5/32-in. choke, with 250 lb. pressure on tubing and 350 lb. on casing. Gas-oil ratio was 140 to 1. The gas volume was 23,800 cu. ft. The flow is through perforations at 3,771-77 ft. in a sand topped at 3,758 ft. and showing oil all the way, with no gas cap. Total depth is 3,781 ft.

A prospective gas discovery well is Southern Minerals Corp. 1 Beasley, wildcat in San Patricio County, 1½ miles southwest of Tynan townsite, and near the Bee County line. On a production test through perforations at 4,902-12 ft. the well flowed gas and salt water through a 7/64-in. choke with tubing pressure 1,620 lb., casing pressure 1,820 lb. Operators squeezed off these perforations and reperforated in the same sand. Total depth is 4,997 ft.

The Kelsey field, in northeast corner of Starr County, has been extended ½ mile to the south by J. O. Clark 1-A Gonzales Unit, in the Santa Teresa grant. On initial gage this test flowed 134 bbl. of oil per day through a 3/16-in. choke, with tubing pressure 285 lb., casing pressure 685 lb., through open hole at 4,748-56 ft., with no water. Gas-oil ratio was 450 to 1. The Clark 2-A Gonzales Unit, 960 ft. southwest of the 1-A well, set 19¾-in. casing at 1,006 ft. and is drilling ahead.

W. C. McBride, Inc. 1 State, wildcat in Bee County, about 4½ miles northeast of Beeville, cored a sand with oil odor at 3,450-3,454 ft. On drill-stem test at 3,451-54 ft. it developed 375 lb. working pressure in 4 minutes and recovered about 30 ft. of oil-cut mud. Operators cored ahead to 3,457 ft. with more oil shows and they are now preparing to run another drill-stem test.

The 27 new locations reported this week included 10 wildcats, 2 each in Hidalgo and Starr counties, and 1 each in Duval, Karnes, Nueces, Webb, Willacy and Zapata counties. Nueces County led with five new locations reported. One new gas pay in West Magnolia City field in Jim Wells County was opened this week while four wildcats were dry, one each in Bexar and Live Oak, and two in Duval County. Falls City pool in Karnes received three oil wells, Tom O'Connor pool in Refugio County and Saxet pool in Nueces County received two oil wells each.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Jim Wells County: New gas pay in West Magnolia City field—Ralph E. Fair, Inc. 1 Wm. F. Filter, in Block 7, Chas. Seefeld farm lands, W. N. Staples Sur., top pay 3,720 ft., TD 5,845 ft., perf. 3,752-53 ft., PT 2,221,000 cu. ft. gas per day through ¼-in. choke, TP 1,195 lb., CP 1,715 lb., no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Bexar County: John Teagle and E. W. Gill 1 Randolph Lemelle, Alfonso Steele Sur. 18, 18 mi. SE of San Antonio, 7 mi. SE of Eckert, dry, TD 2,476 ft.

Duval County: R. S. Hays and Newman Bros. Drlg. Co. 1 J. F. Welder Heirs, Geo. Bodet Sur. 70, 7 mi. NE of Freer, dry, TD 3,118 ft.

Magnolia Pet. Co. 1 Duval County Ranch Co., Section 273, GC&SFRR Sur. 273, 11 mi. W of Freer, dry, TD 3,015 ft.

Live Oak County: Atlantic Refg. Co. 1 Frank P. Morris et al, I. M. Alexander Sur., 19½ mi. SW of Geo. West, dry, TD 10,018 ft.

CANADIAN FIELDS

Jumping Pound Test Develops Fishing Job

CHATHAM. — On the Jumping Pound structure in the foothills west of Calgary, Shell 16-14-J, LSD 16, 14-25-5w5, contacted the Madison limestone at 10,335 ft. At 30 ft. in, some porosity was encountered and drill-stem test was in progress when the bottom 250 ft. of pipe collapsed. The Madison contact was only 388 ft. lower than in Shell 4-25-J discovery well.

Elk Point. — In North Central Alberta, Elk Point 1, LSD 7, 26-56-5w4, joint test sponsored by Home Oil, Anglo-Canadian and Calgary & Edmonton Corp. got a fair gas flow in a drill-stem test at 1,245 ft., and encountered the Devonian limestone at 1,631 ft. The well is deepening close to 2,000 ft. after cementing casing.

West of Viking. — The Home Oil-Anglo Canadian-Calgary & Edmonton group has spudded a second North Central Plains test, West Viking 1, LSD 10, 11-48-15w4. Location is west of the Viking gas field.

Steveville.—In the Steveville - Princess field, eastern Alberta, South Princess Joint Venture C.P.R. 1, LSD 9, 28-19-12w4, is deepening to Devonian limestone after drill-stem test of the Sunburst sand at 3,359 ft.

De Winton.—On the De Winton structure east of Turner Valley, Royalite-De Winton 1, LSD 14, 16-21-1w5, bottoming at 8,397 ft., developed a fishing job in the course of testing the Brown sand at 8,197-8,216 ft. Testing was marked by the first use of agate torpedo reported in the Canadian west.

Fox Valley.—In the Fox Valley area, west-central Saskatchewan, Cypress Fox Valley 1, LSD 16, 26-17-26w3, bottoming at 3,241 ft., is testing. Six gas shows were encountered between 1,513 and 3,019 ft. with oil shows at 3,019 and 3,193 ft.

Vera-Unity. — In the Vera-Unity field, western Saskatchewan, Bata Petroleums 13, LSD 10, 3-39-22w3, finished at 2,174 ft., had gas shows at four depths between 1,293 and 2,088 ft. with oil at 2,070 ft. but was not commercial, and has been abandoned. Bata 14, LSD 14, 28-38-22w3, total depth 2,273 ft., has three gas shows between 1,273 and 1,630 ft. and oil at 1,768 and 2,178

ft., but was not commercial. Bata 15, LSD 13, 13-41-24w3, got 458,000 cu. ft. on drill-stem test at 1,596-1,637 ft. with additional shows at 1,751 ft. and is deepening. Verbata Oils 2, LSD 7, 24-41-21w3, finished at 4,490 ft., had artesian water at 253-310 ft., gas testing 875,000 cu. ft. at 1,575-1,624 ft., an oil show at 1,810-50 ft. and salt at 3,459-3,894 ft.

PERMIAN BASIN

Clearfork Production Opened For TXL Field

MIDLAND.—Phillips Petroleum Co. 1-E-A TXL, Section 39, Block 45, T-1-S, T&P Survey, on the extreme southeast end of the TXL field, Ector County, has opened Clearfork production for the TXL field. It has been completed to flow 138.22 bbl. of oil in 24 hours through perforations from 5,610-825 ft. It was drilled to 11,536 ft. but proved a failure in the Ellenburger. The discovery was then plugged back to the Clearfork, topped at 5,610 ft. Cities Service Oil Co. 1 J. E. Parker, Section 20, Block 44, T-2-S, T&P Survey, wildcat 1¼ miles west of the Harper (San Andres) pool of central Ector County, ran a 1-hour drill-stem test from 12,470-529 ft., using 2,000-ft. water blanket. Recovery was the water blanket cut with oil and gas and 1,230 ft. of oil and gas. Operator was waiting on orders. Ellenburger was topped at 12,480 ft., 9,363 ft. below sea level.

Warren Petroleum Corp. and F. T. Morrow 1 Mrs. Ruby Russell et al, Section 18, AB&M Survey, Abstract 1478, western Menard County wildcat 6 miles northeast of Fort McKavett, has shown prospects of the first oil production for the county. On 1-hour drill-stem test of Canyon section from 2,254-309 ft. there was gas to the surface in 8 minutes and 390 ft. of oil and 20 ft. of oil and gas-cut drilling mud was recovered. Elevation is 2,165 ft. Tests will be made on promising shows of oil and gas from 2,282-90 ft. Humble Oil & Refining Co. 1 B. A. Moore, Section 45, Block 5, H&GN Survey, ½-mile west outpost to the Polar pool in southwestern Kent County, ran an 18-minute drill-stem test from 7,849-7,903 ft. and recovered 20 ft. of drilling mud with no shows. It was drilling below 7,935 ft. in Ellenburger lime.

Sun Oil Co. 2 Keystone, Section 4, Block 77, Public School Land Survey, Silurian discovery in 1945 in the Keystone area of Winkler County, is being recompleted in the Devonian from 8,035-142 ft. After being treated with 4,000 gal. of acid, the well made a 24-hour flowing test of 214 bbl. of oil through ¼-in. choke. Flowing pressure was 280 lb. and shutin tubing pressure was 900 lb. There was no water. The test is 4 miles west and 3 miles north of Stanolind Oil & Gas Co. 1 Mack Taylor, recent Devonian discovery for the field. Hunt Oil Co. 1 E. R. Hill, Section 9, Block B-11, Public School Land Survey, Winkler County wildcat 8 miles south and slightly east of Kermit, perforated casing from 6,185-220 ft. in the Tubb zone and tested salt water with a trace of oil. Operator will squeeze, then perforate opposite 6,160-70 ft. and later is to perforate and test from 6,100-20 ft. Tubb was topped at 6,076 ft.

Wasson "66" and "72" field, Gaines County; Block 31 field, Crane County; Slaughter field, Hockley County; and Fullerton field, Andrews County, each had two completions this week. Welch field, Dawson County, had five locations; Garza field, Garza County, four; Slaughter field, three; and Foster field, Ector County; and McElroy field, Crane County, two each. TXL field, Ector County, has 35 drilling wells, Keystone-Ellenburger field, Winkler County, 27; Fullerton field, 25; Welch field, 13; Block 31 field, 9, and Martin field, Andrews county, 7.

WEST TEXAS SUCCESSFUL WILDCATS

Hockley County: Extension to old oil pool—McCutchin Drlg. (John O'Neill Drlg.) 1 W. T. Coble, Tr. 15, Lge. 66, Hardeman CSL Sur., NW Slaughter field, elev. 3,666 ft., pumped 85 bbl. day through 2-in. tubing, perf. 4,798-4,830 ft. San Andres, gravity 30°, TD 4,830 ft.

Ector County: Extension to old oil pool—Texas 1-F Fraser, Sec. 39, Blk. 45, T-1-N, T&P Sur., 2 mi. N TXL field, flowed 1,451 bbl. day through ½-in. choke on 2-in. tubing, perf. 9,750-86 ft. Ellenburger, gravity 42.7°, gas-oil ratio 949 to 1, TD 9,835 ft.

WEST TEXAS WILDCAT FAILURES

Crockett County: Magnolia 1-B Shannon, Sec. 26, Blk. BB, ELRR Sur., 2 mi. SW World pool, elev. 2,607 ft., San Andres 2,375 ft., dry, TD 2,676 ft.

Midland County: Humble 1 Pio Crespi, Sec. 19, Blk. 38, T-2-S, T&P Sur., 9 mi. SE Midland, elev. 2,702 ft., Devonian 11,410 ft., TD 11,620 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—J. C. Watson Drilling Co. 2 Trimble, 11-17s-32e, outpost to the West Roberts pool, Lea County, was completed for a natural daily flow of 50 bbl. of oil from 4,160-295 ft. Repollo Oil Co. 1 J. E. Simmons, Section 25-31s-37e, east of shallow production in the Eunice area in east central Lea County, had drilled below 7,000 ft. in the lower Permian and was due to continue to the Ellenburger. Magnolia Petroleum Co. 2 Marshall, Section 34-21s-37e, on the north side of the Drinkard (Permian) field, Lea County, flowed 182 bbl. of oil, slightly cut with acid residue, in 4 hours through open 2-in. tubing. It had been treated with 3,000 gal. of acid through perforations from 6,525-89 ft., 6,503-15 ft.,

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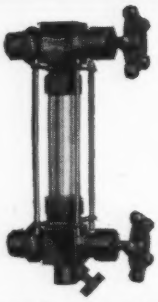

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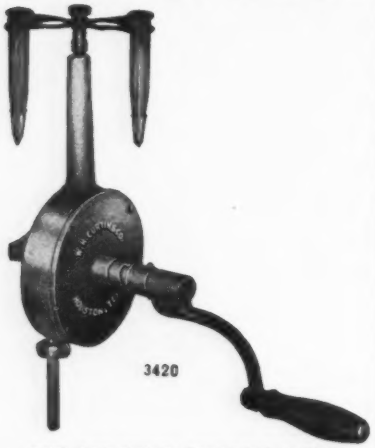

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and 6,464-93 ft. in casing cemented on bottom at 6,619 ft. Humble Oil & Refining Co. 1-B Federal-Leonard, 12-26s-37e, Ellenburger test ¼ mile north of the discovery of the Dublin pool of eastern Lea, with total depth of 12,585 ft., plugged back to 6,345 ft. Casing was perforated one hole per foot from 6,135-220 ft. A 1-hour drillstem test was run with packer set at 6,130 ft. Recovery was 2,000 ft. of drilling mud and 3,080 ft. of salty sulfur water. Operator was plugging back to around 5,300 ft.

Young and Paddock fields, Lea County, each had one completion this week. Paddock and Drinkard fields, Lea County, each two locations, and Square Lakes and Russell fields, Eddy County, each had one. Drinkard field has 16 drilling wells; Paddock field, 15; Square Lakes field, Eddy County, 12; Grayburg-Jackson field, Eddy County, 9, and Brunson field, Lea County, 5.

ROCKY MOUNTAIN

Heavy Flow Continues From New Horizon at Rangely

DENVER.—The discovery of a new producing horizon in the Rangely field in Continental Oil Co. 2 Dorothy Rooth, C SW SW 15-2n-103w, an outpost on the west side of the field, continued to be the outstanding development of the week. The well has produced approximately 5,000 bbl. of oil since it blew in, the rate of flow varying extensively as work was in progress, the best testing putting 133 bbl. of clean oil in the tanks in 1 hour. There is no water with the oil, samples of which have been sent to a refinery for analysis, but which appears to run better than 38°-gravity. The electric log puts the total depth at 6,110 ft. The 9⅝-in. was cemented at 5,966 ft., leaving 144 ft. of open hole from which the tubing sanded up quickly. The sand horizon is at 6,060-6,110 ft., the entire section apparently being saturated with the most prolific intervals in the first and last 10 ft. The well was killed in order to run a liner between the bottom of the casing and the top of the pay, but it is probable that the tubing will be run and the well produced pending arrival of the liner. The ground elevation is 5,753 ft.

The horizon tentatively is identified as the Shinarump, which correlates with the red beds, or Chugwater as it is called in Wyoming. It lies approximately 600 ft. above the top of the Weber, the principal producing horizon. There is much speculation concerning the significance of the discovery, but so far this is based on conjecture. Structural maps show a northwest-southeast fault about half a mile south of the well. To what extent, if any, this has a bearing on the situation is not yet apparent. Some believe that a large extension of the field to the west, even exceeding the present producing area, is among the possibilities. Another theory is that the horizon may be productive in the field proper, and was drilled through without its significance being apparent until the Rooth well kicked off and revealed the new pay. An examination of the electric log of a nearby well gives some credence to this theory as it showed a considerable bulge at the same interval. The result is that a general study of logs is taking place to ascertain whether there is any foundation for this theory. It will be recalled that a producer was encountered in the Morrison, at around 4,000 ft. in a Texas Co. well making better than 30 bbl. an hour. Since then the Morrison has been cored in a number of wells to determine the extent and possibilities of that horizon. Several wells have been cored all the way through the Weber to aid in developing production technique, but no coring through the red beds has been reported.

Good well at Gebo.—Continental Oil Co. 14 Gebo Unit, SW NE NE 23-44n-95w, an outpost on the northeastern side of the Gebo field, flowed 348 bbl. in 24 hours from the Embar through perforations at 4,852-90 ft. There was no water.

Wilson Creek program.—The drilling program at the Wilson Creek field, east of Rangely, Rio Blanco County, Colorado, is reported nearing its end. There are now 26 producing wells and 1 drilling. One more is scheduled. The field is operated by Texas Co. for its joint account with the California Co., and production comes from the Morrison and Sundance sands. Current production is around 7,150 bbl. daily. The field recently was electrified and compressor station built to repressure the sand with casinghead gas.

Sand Draw blowout. — Sinclair-Wyoming Oil Co. 3 Unit, SW SE SE 10-32-95w, Big Sand Draw, Fremont County, Wyoming, which had a blowout at 6,645 ft., making estimated 25,000,000 cu. ft. of gas per day and spraying oil from the Embar, was successfully killed after 30 hours, and is shut down to clean up rig and install blowout preventer.

Wasatch at East Bailey.—Wasatch Oil Refining Co. 1 Cameron Unit, SW SW SW 13-26n-89w, East Bailey Dome wildcat, Carbon County, Wyoming, which gave some indications of being a small discovery in the Tensleep, is plugging after swabbing dry, making no fluid on final test. It was drilled to 6,972 ft., and had the top of the Tensleep at 6,850 ft. On a previous test it had made 75 bbl. of oil in 8 hours with some salt water after plugging back to 6,940 ft., acidizing and shooting.

New operations.—There were 27 new operations, of which 11 were in Colorado, 6 in Wyoming, 5 in Montana, 2 in Utah, and 3 in northwestern New Mexico. All were development wells except one wildcat in Utah and another in Hill County, Montana. The Colorado locations were all in the Rangely field, five each by Stanolind Oil & Gas Co. and California Co., and one by

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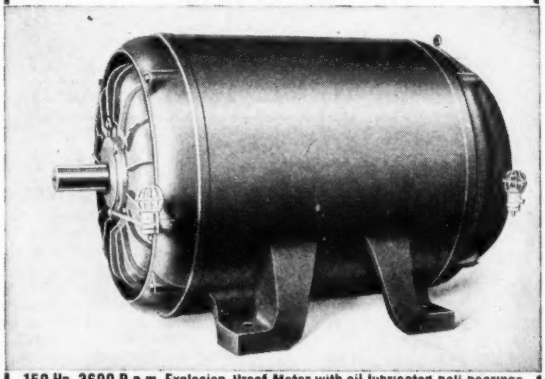

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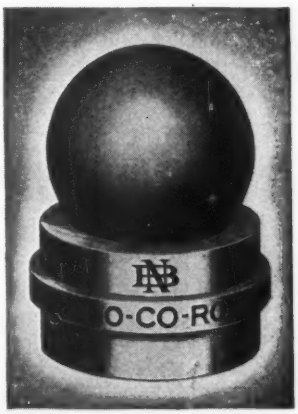

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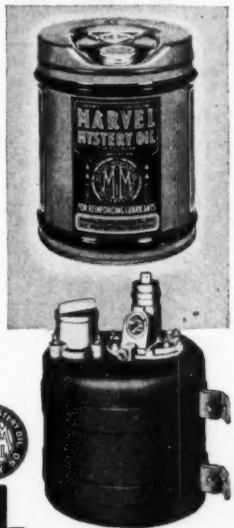

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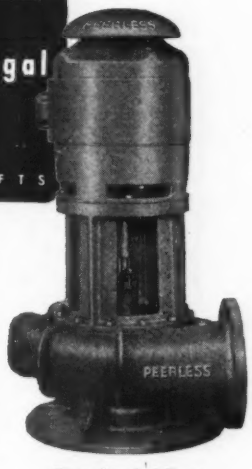

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Phillips Petroleum Co. Wyoming new operations included two at Zimmerman Butte by Pacific Western Oil Corp., and one each at Frannie and Big Muddy by Continental Oil Co., and one each in Salt Creek and North Baxter Basin. Montana locations included two in Cat Creek and one each in Kevin-Suuburst and Cut Bank. The Montana wildcat is Midwest Drilling Co. 1 Schnitzmeyer, SE SW NE 14-25n-16e, Hill County. The Utah operations include an inside well at Clay Basin in Daggett County by Mountain Fuel Supply Co., and a wildcat on the Gordon Creek structure in Pacific Western Oil Corp. 1 Unit, C SE NE 24-14s-7e, in Carbon County. It will go to the Weber at around 8,000 ft. The structure is almost oval in shape with several north-south faults crossing it near the apex. There are approximately 25,000 acres within the unitized area. The New Mexico locations include two in the Hispah field in McKinley County, and one in Fulcher Basin in San Juan County.

Completions.—Thirteen wells were completed, of which 9 were oil wells with initial production of 1,743 bbl., 2 were gas wells and 2 were dry holes. Colorado had 2 oil wells, both in Rangely, for 575 bbl., and one dry wildcat. Wyoming had 4 completions, all oil wells for 1,092 bbl., one each at Gebo, Frannie, River Dome, and North Baxter Basin. Montana had 4 completions, of which 2 were oil wells in Kevin-Sunburst for 26 bbl., and 1 in Cat Creek for 60 bbl., and 1 dry wildcat. New Mexico had 2 gas wells in Fulcher Basin.

COLORADO WILDCAT FAILURE

Lake Creek, Jackson County: John Farraiy 1 Hill, NW NE SW 21-11n-81w, TD 1,462 ft., dry in Pierre shale.

WYOMING SUCCESSFUL WILDCAT

River Dome District, Washakie County: Pure Oil Co. 1 Unit, NE NE NW 18-48n-92w, TD 11,379 ft. in Big Horn lime, plugged back to Embar and through perforations 9,990-10,020 and 10,020-10,055 ft., flowed 1 bbl. oil per hour with 250,000 cu. ft. of gas on final test. Top Embar 9,978 ft.; Tensleep, 10,245 ft.; Amsden, 10,420 ft.; Madison, 10,570 ft.; El. 4,035 ft.

MONTANA WILDCAT FAILURE

Nine Mile, Big Horn County: Mackinnie Oil & Drilling Co. 5 Ottum, C NW NW 3-1s-34e, TD 2,980 ft., water in Dakota, Lakota and Morrison.

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N. CENTRAL TEXAS

Young County Discovery Awaits Pipe-Line Connection

WICHITA FALLS.—A. R. Dillard 1 Marietta Killiam, Section 211, TE&L Survey, Abstract 458, recent Mississippi lime discovery 5 miles south of Olney, Young County, is shut in for pipe-line connection after flowing 25 to 50 bbl. of oil hourly on various-size chokes through perforations from 4,945-60 ft. Operator has staked a ¼-mile east outpost as his 2 Marietta Killiam, 330 ft. from the north and east lines of Section 211, TE&L Survey. Two and one-half miles northwest, R. C. Davis and J. C. Jennings 1 Baldwin-Lovett, Block 207, TE&L Survey, topped the Mississippian at 4,798 ft. A drill-stem test from 4,835-64 ft. had gas to the surface in 1 minute and the well began to flow oil in 24 minutes. Operators have cemented 5½-in. casing on bottom.

Bennett & Sorrels 1 C. W. Milton, Section 13, Titus County School Land Survey, Abstract 730, wildcat 6 miles east of Sunset, Montague County, cored from 7,945-63 ft. and recovered 14 ft. of lime with a slight show of oil. Operator drilled to 8,017 ft. and set 7-in. casing at 7,633 ft. Ellenburger was topped at 7,830 ft. Elevation is 981 ft. Continental Oil Co. will drill a 7,500-ft. wildcat 4 miles southwest of Montague and 2½ miles southeast of the Hildreth pool in Montague County. It is 1-B John B. Lewis, 330 ft. from the south line and approximately 7,150 ft. from the most westerly west line of Nancy B. Ussery Survey, Abstract 824.

Hanlon-Buchanan, Inc., 2 W. R. Mathis et al, G. W. Davis Survey, Abstract 187, wildcat 8 miles southwest of Jacksboro, topped the Mississippian at 5,354 ft., and the Ellenburger at 5,410 ft. Dolomitic lime with a trace of oil was drilled from 5,410-30 ft. It was drilled to 5,510 ft. where drill-stem test will be run with packer set at 5,410 ft.

Electra field, Wichita County, had four completions this week; Joy field, Clay County; Wilson field, Cooke County, and Holliday field, Archer County, each had two. Electra field had six locations; Holliday field, Ewalt field, Throckmorton County, and Knox field, Young County, each had two. Holliday field and Knox field each had six drilling wells, National field, Wilbarger County, four, and Sivell's Bend field, Cooke County, and Rose field, Haskell County, each have four.

In West Central Texas, Buttram field, Jones County, had three completions and Idria Kelso field, Jones County, had two. Buttram field and Sanders field, Shackelford County, each have two locations. Eolian field, Stephens County, has four drilling wells, Silver Valley field, Coleman County, three and Palo Pinto Regular field, Sanders field and Loving field, Stephens County, each have two.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCAT

Jack County: New gas pool—Continental 1 W. H. Heath, C. A. Beaty Sur. A-1358, 3 mi. E Perrin, elev. 1,161 ft., flowed 1,070,000 cu. ft. gas natural open flow at 4,432-42 ft. Bend, TD 6,625 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: C. G. Butts 1 Annie Penartz, Lot 19, Blk. 4, Clark & Plumb Subd., 3 mi. W Windthorst, elev. 1,051 ft., dry, TD 1,145 ft.

Smiley-Norwood Drlg. et al 1 E. P. Griffin et al, Blk. 19, Palo Pinto CSL Sur., ½ mi. E and 5 mi. N Dundee, elev. 1,055 ft., dry, TD 1,979 ft .

Cooke County: Roy Guffey and Bell-Wells Oil Co. 1 J. W. Ross et al, A. C. C. Bailey Sur., 3½ mi. W and ½ mi. S Woodbine, elev. 765 ft., Ellenburger 3,940 ft., dry, TD 3,957 ft.

Hollandsworth Drlg. 1 G. Alexander, H. Nail Sur. A-790, 2½ mi. W and ½ mi. N Era, Ellenburger 1,280 ft., dry, TD 1,464 ft.

J. F. Hood and B.O.M. Lutmer, I. Sanders Sur. A-928, 2½ mi. S and 2 mi. W Muenster, Ellenburger 2,298 ft., dry, TD 2,367 ft.

Norwood et al 1 T. G. Moss, SA&MG Sur. A-1218, ½ mi. E and ¼ mi. N Lea, dry, TD 1,290 ft.

Standard of Ohio 1 Ralph Breeding, J. Hawkins Sur. A-497, 1 mi. W. Gainesville, Ellenburger 3,046 ft., dry, TD 3,091 ft.

Trout & Hansen Prod. 1 J. B. Pace, M. P. Reid Sur. A-869, 1 mi. S and W Gainesville, elev. 716 ft., dry, TD 2,510 ft.

Cottle County: Anderson-Prichard Oil Corp. 1 Lynch, Sec. 66, J. Poitevent Sur., 5 mi. N and 7 mi. E of SW corner of county, dry, TD 5,836 ft.

Throckmorton County: Eastland Oil 1 J. B. Mathews, Sec. 228, ETRR Sur., 6 mi. E and 1 mi. N of SW corner of county, dry, TD 1,589 ft.

Wichita County: J. D. Thweatt et al 1 W. F. George, Sec. 3, GC&SF Sur. A-364, elev. 1,117 ft., dry, TD 1,980 ft.

Wilbarger County: S. D. Johnson 1 Porter-Ayres, Sec. 58, H&TC Sur. A-1847, 1 mi. E and 2 mi. S Doan, elev. 1,181 ft., dry, TD 5,312 ft.

Young County: Timberlake & Kelleher 1 Henry Koester, Sec. 1369, TE&L Sur., 4 mi. E and 1 mi. S Olney, elev. 1,217 ft., dry, TD 1,030 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Coleman County: Harvey & Henderson et at 1 J. E. McCord, J. W. Meek Sur. No. 159, 3 mi. W Glencove, elev. 2,143 ft., Caddo 3,920 ft., dry, TD 3,937 ft.

Jones County: Frank Buttram, Inc., 1 C. J. Taylor, Goliad CSL Sur. No. 358, Subd. 4, 2 mi. SW Neianda, elev. 1,823 ft., dry in Swastika, TD 2,905 ft.

N. D. Fritzgerald 1 H. Propst, Sec. 10, Blk. 1, T&NO Sur., 2½ mi. SW Anson, elev. 1,761 ft., dry in Swastika, TD 3,003 ft.

H. K. Riddle 1 Idaline King, Barnhouse Goliad CSL No. 358, ¾ mi. S Neianda, elev. 1,782 ft., dry in Flippen, TD 2,870 ft.

Taylor County: Staley Oil Co. et al 1 J. W. Teaff, Subd. 22, Grimes CSL No. 124, 3 mi. NE Merkel, elev. 1,843 ft., Upper Hope 2,710 ft., dry, TD 2,763 ft.

C. S. Herring 1 Mrs. Ida Armstrong, Subd. 12, Grimes CSL, 1¾ mi. NE Merkel, elev. 1,875 ft., Lower Hope 2,744 ft., dry, TD 2,926 ft.

APPALACHIAN FIELD

Oriskany Topped at 4,931 Ft. In Ravenswood Test

PITTSBURGH.—In Ravenswood district, Jackson County, West Virginia, West Virginia Gas Corp. is drilling through the Oriskany sand in the test 537 George W. Curry, Jr., et al and from a surface elevation of 697 ft. the Oriskany sand was topped at 4,931 ft. There was a high gage of 1,200,000 cu. ft. gas in the top of the

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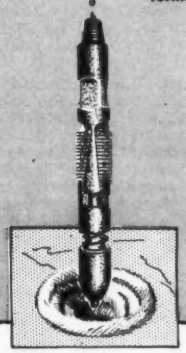

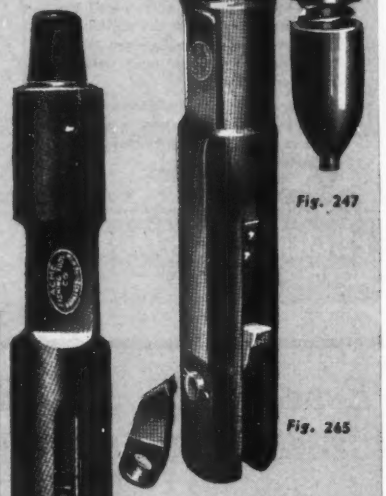

Fig. 247

Fig. 265

Fig. 265—Acme Heavy Duty Collar Buster. Most efficient means of parting string of casing at coupling when pipe is stuck. Quicker. Safer. Saves pipe.

Fig. 247 — Acme Improved Trip Casing Spear of Finger Trip Ring, 3-Slip Type. Exclusive, patented features and extra ruggedness make it the "Big Chief" Pipe Puller.

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Ben Franklin said, "Beware of the BIG penny's worth", meaning, of course, that you may expect a "boot in the breeches" when you look only at the price-tag before buying . . .

As a fishing job is no place to take chances, Acme Fishing Tools have long been the *first* preference of fishermen who know tools best...

Such dependability rests not alone upon rigidly selected, scientifically heat-treated, precision machined metals, but even more on that *priceless* human element which, at Acme, is manifest by 46-years of specialized designing ability, better skilled hands and deep-rooted pride of craft . . .

Consider well, then, the ever-dependable name, ACME, before you buy.

Fig. 208

Fig. 208 — Acme Side Slot Combination Socket. Known throughout oil world as a most superior tool to fish out tools lost or stuck in hole. If it's STAMINA and RESULTS you want, here 'tis.

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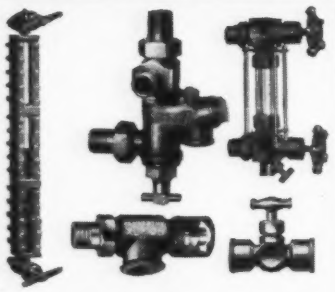

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sand which has since frozen back to 140,000 cu. ft. which should be improved with shot and back pressure. Here, seven other wells are drilling to the Oriskany with the nearest to completion being United Fuel Gas Co.'s 5,744 Homer Nelson which topped the Corniferous lime at 4,826 ft.

In Elk district, Kanawha County, Columbian Carbon Co. drilled through the Oriskany sand in the test 871 D. W. Hughes with a top gage of only 15,000 cu. ft. gas and 1 bbl. oil. From a surface elevation of 894 ft. the Corniferous lime was topped at 5,008 ft., Oriskany 5,141 ft., gas and oil 5,147 ft., show of salt water at 5,166 ft., shot at 5,141-81 ft., total depth 5,200 ft. The gas did not improve with shot but the oil now appears good for 10 bbl. a day which will be tested.

In this district, Glen Dearth drilled through the Oriskany in the test George C. Bryant and it was dry. The Corniferous lime was placed at 5,078 ft., Oriskany 5,201 ft., total depth 5,238 ft.

In Washington district, Lincoln County, Ware Drilling Co. completed a test on Birealia Hudson farm which had a final open flow of 1,205,000 cu. ft. gas from the Brown shale, total depth 3,720 ft. In Duval district, United Fuel Gas Co.'s 2,517 Horse Creek L & M Co. was good for 858,000 cu. ft. gas from the Brown shale, total depth 4,055 ft.

In Clay district, Ritchie County, J. H. Cole No. 2 Henry C. Schulte was completed in the Injun sand and gaged 678,000 cu. ft. gas, total depth 2,025 ft.

New locations totaled only five and were in South West district, Doddridge County; Elk district, Kanawha County; Murphy district, Ritchie County, and Oceana district, Wyoming County.

New locations in southwest Pennsylvania totaled 10 and were in Bethel Township, Armstrong County; Clarion, Monroe and Porter townships, Clarion County; Cumberland township, Greene County; Armstrong and Washington townships, Indiana County; Beaver township, Jefferson County.

CALIFORNIA

Pumping Well Assured On Formation-Test Results

LOS ANGELES.—Shell Oil Co., Inc., which is drilling a joint test for six major operators in the El Segundo-Playa Del Rey area, made two formation tests this week, one being favorable and the other decidedly negative. With bottom of the hole at 7,033 ft. in schist, a formation test was made at 6,875-939 ft., open 5½ hours, and the recovery consisted of 1,880 ft. of heavy oil, 470 ft. of mud, and 187 ft. of oil and mud. On a 67-minute test at 6,952-7,033 ft., the recovery was 6,284 ft. of oily mud and salt water. The test of the lower part of the hole suggested bottom water and the hole is being plugged back for a test of the interval above 7,000 ft. On the basis of the showing of this wildcat to date, a pumping well appears assured. A short temporary flow might be developed but there does not seem to be enough gas volume to justify any expectation of a sustained flow.

Development of salt water in the bottom of the hole is of more than passing interest because the top of the schist basement has been placed at 6,854 ft. The low-gravity oil recovered is another matter that is rather surprising. The recovered oil from the formation test of the top interval appeared to be about 17 gravity but may test even lower than this estimate as some allowance has been made for contamination. Oil from the two adjacent fields, El Segundo and Playa Del Rey, is in the 21°-25° range which indicates a possible migration

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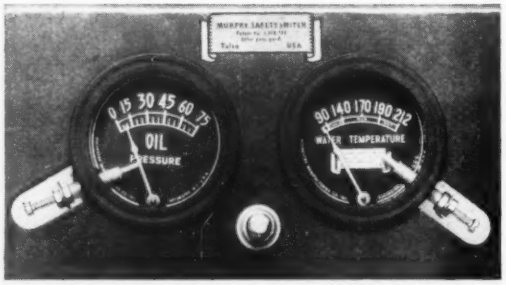

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of the lighter hydrocarbons out of the new area.

Shell was designated as the operator by the interested companies some time ago but the actual drilling is being done by Rocky Mountain Drilling Co. Richfield Oil Corp., Shell, Standard Oil Co. of California, Texas Co., Tide Water Associated Oil Co. and Union Oil Co. bought this acreage in fee back in 1937 for a consideration of $900,000. The original tract, designated as the Rancho Sausal Redondo, consisted of 1,300 acres of which 900 acres was recently sold to the City of Los Angeles to permit expansion of the Mines field airport. Standard of California engineered the original deal but felt the expenditure too large for a single company and invited six other operators to participate in the undertaking. The group retained subsurface rights in the acreage sold to the City of Los Angeles but will be obliged to develop this acreage by directional drilling if an accumulation is found.

Exploration and exploitation activities in the Newport-Huntington Beach area, where two or three pool discoveries have been made in recent months, are being expanded. This extension work in the area between Newport and Huntington is complicated by faulting so that the real significance of this area remains to be determined by additional drilling. After several days of testing, A. W. Lyddon succeeded in completing 7-1 Anaheim Sugar flowing 951 bbl. of 17°-gravity oil per day and has found an accumulation on the downthrow side of the Huntington-Newport fault. Lyddon's next test will be drilled north and east of the discovery and appears justified on the basis of showings logged in a wildcat drilled prior to the Anaheim Sugar test. The Atha pool, located south of Lyddon's discovery, has yielded several excellent flowing wells and additional development is under way. These are not major discoveries and under the A.A.P.G. - A.P.I. nomenclature are classified as pools within the Huntington Beach field and Huntington-Newport district. The regional classification is Los Angeles Basin.

In spite of recent discoveries in the Huntington - Newport quadrangle, Wilmington still continues to be the hot spot, due to exploitation activities in the prolific 237 zone of Miocene age. Due to restricted gas outlets, all wells producing from the 237 zone have been cut back to 800 bbl. per day.

Amerada Petroleum Corp. appears to have found something promising in 1-A Winship in Solano County. The Winship wildcat, located in Section 15-6n-2e, was drilled to 5,000 ft. and subsequently plugged back. The hole was then cleaned out to 4,825 ft. and a string of 5½-in. casing cemented at that point. Amerada has previously discovered two commercial gas fields in this area and if the present wildcat is completed as a gas producer it will mean that the company will have found three gas fields in one township of 36 sq. mi. The most northerly gas field is located in Sections 2 and 12 and the most southerly field is located in Sections 26 and 35. The Winship wildcat is located northwest of the most southerly field and is on a trend as well as having responded satisfactorily to geophysical work.

Bender Oil Operations, which recently extended the productive limits of the Poso Creek field located west of the Kern Front field, is drilling an important outpost east of the Kern River field in Section 22-28s-28e. Location is 1,120 ft. north and 550 ft. west of the east quarter corner of Section 22. Meanwhile, Tide Water Associated is preparing to drill a second deep test at Kern River in Section 29-28s-28e.

New locations this week were somewhat below completions but this is a temporary condition as the number of drilling strings in operation has been quite stable during the past few months and will undoubtedly continue at about present levels for the remainder of the year.

SUCCESSFUL CALIFORNIA WILDCAT

Orange County, Huntington Beach district:

Mr. Oilman — Looking for an engine that thrives on loneliness — far from spare parts and service? Mister, it's time you met up with a Sheppard Diesel. Sure, it may need some adjustments now and then — all engines do. *But* — and here's the *big* difference — Sheppard Diesel design is so simple that any repairs, short of a general overhauling, can be done right in the field by yourself! We don't think there's another Diesel built that has been simplified to the same extent. Write for our new 16 page booklet showing cutaway views of the simplified Sheppard fuel injection system, cooling and lubricating systems. See *why* Sheppard owners say . . .

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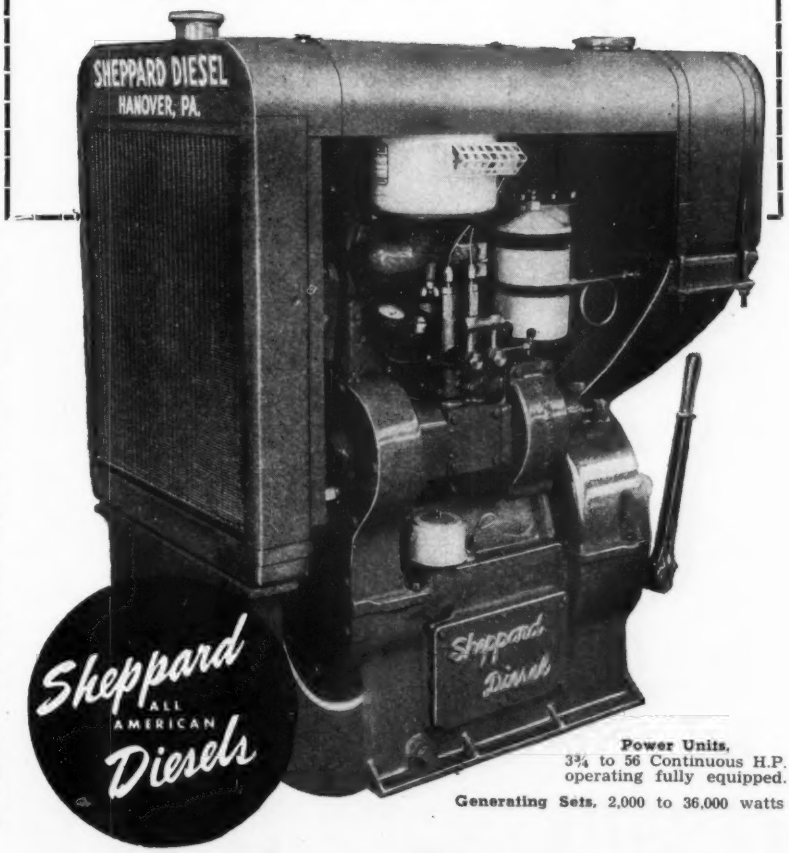

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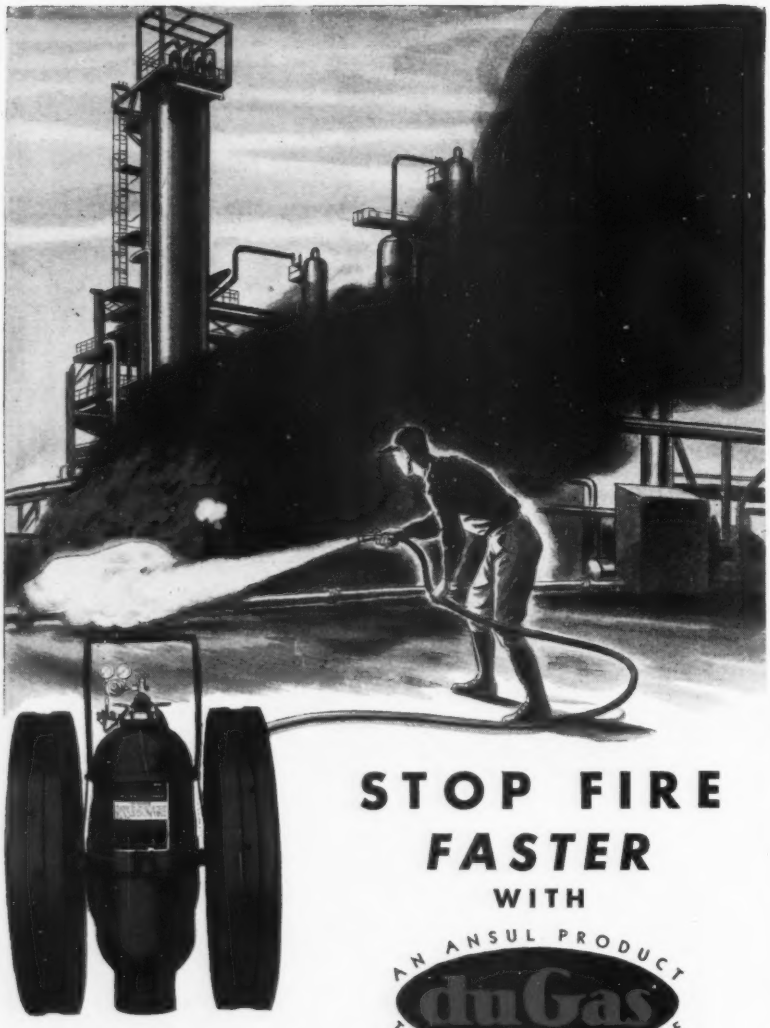

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ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

A. W. Lyddon 7-1 Anaheim Sugar, 7-6s-10w, flowed 950 bbl., 17.1°-gravity, 2 per cent cut, 250,000 cu. ft. gas, TD 6,930 ft., perforated 5,640-90 ft. New accumulation immediately east of Huntington Beach field. Production coming from probable equivalent of C zone found originally at Newport.

CALIFORNIA WILDCAT FAILURES

Los Angeles County, Gardena: Ohio 1 Gardena Comm. 4, 23-3s-14w, bottomed in schist, swabbed salt water, very little oil or gas, TD 10,288 ft. This is second unsuccessful drilled by Ohio at Gardena but first well showed unusual promise until water trouble developed. First test showed oil and gas but could not shut off water.

Orange County, Seal Beach: Shell 1 Community, 3-5s-12w, bottomed in barren gray sand, showed small production but not commercially productive, TD 9,798 ft.

Tulare County, Tipton: Union 45-8 Griffin, 8-22s-16e, bottomed in basement slate, top slate 3,728 ft., only minor gas showings, TD 3,746 ft.

OHIO, KENTUCKY

Perry County Offset Has Good Flow of Gas

COLUMBUS.—The Bradford Producing Co. 1 Massuros-Pappas, Section 32, Hopewell Township, Perry County, topped the Clinton at 3,028 ft. and at 3,058 ft. had 944,000 cu. ft. gas. The completion is a west offset to the pool discovery on Underwood.

B. G. Davis 2 Orval Maxwell, Section 32, Wayne Township, Muskingum County, stopped 22 ft. in the Clinton sand with a gage of 4,250,000 cu. ft. gas and a rock pressure of 1,250 lb.

Forty strings of tools are now running in the town lot drilling around the City of Canton. The last week's completions, all gas wells, totaled seven.

Cambridge field reported seven new locations for the week, Stewart reported six, Sandyville four, Ashland, Brush Creek, and Lancaster two each. Sandyville led in completions with seven.

OHIO WILDCAT FAILURES

Muskingum County, Adams Township: Wittmer Co. 1 C. A. Klein, Sec. 10, Clinton, 4,218 ft., dry, no Medina sand, TD 4,359 ft.

EASTERN KENTUCKY

ASHLAND.—Two dry-hole notations and a Big Six completion were reported in the Eastern Kentucky field of operations during the past week, all by Kentucky-West Virginia Gas Co.

Well No. 5643 on the George Allen property in Magoffin County, 2,927 ft., brought 169,000 cu. ft. in Big Six.

Well No. 5648 on the W. J. Slone property, Knott County, 2,910 ft., brought 56,000 cu. ft. in Shale and 33,000 cu. ft. in Big Lime.

Dry holes were marked on Well No. 806 on the Garland Hurt property, Pike County, 2,943 ft., and Well No. 818, Betty Shepherd property, Magoffin County, 2,424 ft.

Patterson, Dyer and Rader completed Well No. 1 on the Orville Fox farm, Cavanaugh Creek, Jackson County, 866 ft., as a dry hole, and Well No. 3 on the Lee Bingham property, Black Water Creek, Jackson County.

WESTERN KENTUCKY

OWENSBORO.—Hoosier Drilling Co. apparently is extending the Birk City of Henderson County to the east with the 1-D C. A. Dempewolf, NE NE NE 18-P-27. Operators are now coring in the Benoist at 1,636 ft. Previously on a drill-stem test of

the Tar Springs sand at 1,477-86 ft., the well indicated a production of approximately 100 bbl. daily.

Other wildcats in the Western Kentucky area remain at routine stages of drilling with no important shows reported from any during the past week. One new wildcat was announced during the week. It was the H. H. Weinert 1 Fee, 15-L-25, Hopkins County, where pits are being dug at present.

Only two completions were reported for Western Kentucky during the past week, one of these a dry hole. Seven new operations were reported, including five for Henderson County and one each for Union and Hopkins counties.

INDIANA

EVANSVILLE.—Indiana completions remained at a relatively high level during the past week with four oil wells and three dry holes reported. One of the dry holes, the Carter Oil Co. 1 John Larkin, SE NE SW 17-6s-14w, was a wildcat which had previously encountered some oil shows.

Addison Warner 2 Carl Schmidt, Pike County wildcat in NE NE SE 18-1n-8w, is drilling ahead below 1,141 ft. with the McClosky expected at about 1,500 ft. Continental Oil Co.'s deep test in the Griffin pool of Gibson County, the 1-D Cooper estate, SW SW 13-3s-14w, is drilling ahead at 5,422 ft.

Twelve new operations were reported in Indiana during the week, none of which were wildcat tests. They were located five in Posey County, two each for Pike and Gibson, and one each in Knox, Spencer and Vanderburgh counties.

INDIANA WILDCAT FAILURE

Posey County: Carter Oil Co. 1 John Larkin, SE NE SW 17-6s-14w, dry at 2,944 ft., elev. 363 ft.

EASTERN TEXAS

Carthage Field Extended Four Miles North

DALLAS.—Rogers Lacy 1 Key, A. Crocker Survey, has extended the Carthage field of Panola County 4 miles north into Harrison County. It is 14 miles south of Marshall. The well was drilled to 6,625 ft. and found gas in both the Upper and Lower Pettit. Five-and-one-half-inch casing has been cemented at 6,350 ft. for completion attempt. Rogers Lacy 1 Baker, A. Albright Survey, Abstract 24, has defined the north limits of the Whelan pool, Harrison County. A drill-stem test to 6,810 ft. in the Rodessa tested salt water. It was drilled to 6,857 ft. The well, 2½ miles north of the pool, had no shows.

Humble Oil & Refining Co. 2 Pickering Lumber Co., W. D. Woodfin Survey, 1 mile southwest of the gas discovery in the Huxley field of Shelby County, topped the Pettit at 6,400 ft. Elevation is 261 ft. On a drill-stem test from 6,635-62 ft., recovery was 290 ft. of gas-cut mud with a slight oil show and 90 ft. of salt water. The tool was closed after 48 minutes. It was drilling below 6,900 ft. B. F. Phillips 1 C. C. Crews, Leonard Perkins Survey, wildcat 7 miles south of Gladewater, Gregg County, is standing after swabbing gas, some oil, and considerable b.s. and w. from perforations from 3,720-23 ft. The test filled in 24 hours and will be swabbed down again. The well is 2½ miles west of production in the East Texas field.

Hawkins field, Wood County, and Carthage field, Panola County, each had three completions. Tri-Cities field, Henderson County, and Hawkins field each had two locations. Carthage field has 32 drilling wells; Hawkins field 20; New Hope field, Franklin County, and Sand Flat field, Smith County, each 5, and Long Lake field, Anderson County, 4.

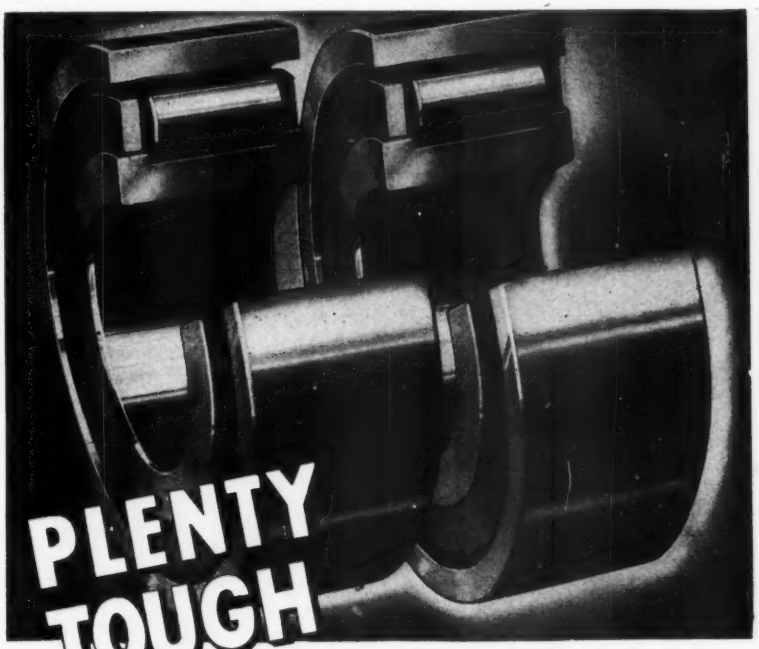
ILLINOIS

North Extension of Bible Grove Field Indicated

MATTOON. — The Gilliam-Aspin Drilling Co. 1 R. H. Rinehart, SE NW NW 27-6n-7e, Effingham County wildcat, showed promise of extending production in the Bible Grove field about ½ mile to the north last week when a 1-hour drill-stem test recovered 165 ft. of gas and 55 ft. of oil. The test was of saturation encountered in the Cypress sand at 2,537-47 ft., total depth 2,549 ft. Operators have set casing on the Cypress for further tests.

The Wabash County prospective pool opener, George S. Engle 1 Clint Guisewite, SW SW SE 23-1n-13w, is being put on pump to test the McClosky at 2,599-2,606 ft., total depth. After drilling plug, operators treated the pay zone with acid, but no gage has been made available to the present time. Prior to setting casing, however, the well filled with oil at the rate of 50 ft. an hour natural. The 1 Guisewite is approximately ¾ mile northeast of the Friendsville field, but three dry holes have been drilled between it and other producing wells in the field. It appears that the present test, therefore, will open a new area rather than extend the productive area of the field.

A drill-stem test was scheduled to start at the close of the week at the M. J. Mitchell 1 Keeler, SE SW 21-1s-5e, Wayne County wildcat ¾ mile northwest of the Keenville field. Both cores and electric log of this well indicated commercial sat-



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uration in the McClosky lime at 3,118-24 ft., total depth 3,127 ft.

Illinois completions remained at a high level during the past week with 31 oil wells and 21 dry holes reported. Included were 10 dry and 1 successful wildcats. First reports for the week totaled 43, and included 5 new wildcat starts.

ILLINOIS SUCCESSFUL WILDCAT

Clay County: K. & B. Drilling 1 Patton, SW NW SE 21-3n-7e, pumped 8 bbl. of oil and 25 bbl. of water, 1,000 gal. acid in McClosky 2,963-74 ft., 25-qt. shot Benoist 2,801-10 ft., TD 3,080 ft., PB 2,808 ft.

ILLINOIS WILDCAT FAILURES

Coles County: Kingwood 1 D. Burtschi, NE NE SE 34-13n-7e, dry at 2,067 ft., Glen Dean 1,608 ft., Cypress sand 1,750 ft., Renault 1,879 ft., Aux Vases sand 1,886 ft., Ste. Genevieve 1,925 ft., Rosiclare 1,937 ft., Fredonia 1,972 ft.

Cumberland County: W. R. Kuykendall 1 Walden, SW SE SE 25-9n-9e, dry at 2,706 ft., Glen Dean 2,163 ft., Barlow 2,288 ft., Cypress sand 2,323 ft., Aux Vases sand 2,548 ft., Ste. Genevieve 2,594 ft., Fredonia 2,665 ft.

Fayette County: H. Luttrell 1 Jahrans, SE SW SW 35-5n-3e, dry at 2,362 ft., Glen Dean 1,766 ft., Benoist sand 2,138 ft., Aux Vases sand 2,198 ft., Ste. Genevieve 2,216 ft.

Shelby County: Joe Reznick et al 1 Miller, SW NW NW 24-11n-4e, dry at 2,100 ft., Glen Dean 1,588 ft., Cypress sand 1,778 ft., Benoist 1,848 ft., Renault 1,938 ft., Aux Vases sand 1,946 ft., Ste. Genevieve 1,994 ft., Rosiclare 2,010 ft., Fredonia 2,055 ft.

Madison County: Joe Kesl 1 Messerli, SW NE NW 35-5n-6w, dry at 1,924 ft., Ste. Genevieve 898 ft., Devonian 1,822 ft.

Washington County: Ben Taylor 2 Bauza, NW SE NW 7-3s-1w, dry at 1,431 ft., Tar Springs sand 988 ft., Glen Dean 1,046 ft., Barlow 1,198 ft., Cypress sand 1,242 ft., Benoist 1,393 ft.

Wayne County: Wiser Oil & Olsen 1 Shannon, SW SW NE 29-2n-9e, dry at 3,176 ft., Menard 2,305 ft., Tar Springs sand 2,448 ft., Glen Dean 2,501 ft., Barlow 2,716 ft., Cypress sand 2,244 ft., Benoist 2,939 ft., Ste. Genevieve 3,055 ft.

Sam Malis 1 J. Williams, W½ SW NE 30-1s-6e, dry at 3,272 ft., Levias 3,118 ft., McClosky 3,209 ft.

White County: Vei & Vanopr Co. 1 Bull Island, SE SE SE 24-4s-14w, dry at 3,032 ft., Glen Dean 2,318 ft., Benoist sand 2,722 ft., Renault 2,822 ft., Ste. Genevieve 2,884 ft., McClosky 2,967 ft.

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LA.-ARK.

New Activity Projected For North Louisiana

SHREVEPORT.—Important new activity was projected for North Louisiana this week, with a wildcat drilling campaign started in the Jackson-Winn area. H. L. Hunt, moving in rig to 25-12n-5w, will drill a 9,000-ft. test close to his gas-distillate discovery well. Union Oil Co. of California filed leases from the Hansfield Lumber Co. and Southern Advance Bag & Paper Co., agreeing to drill 10 wells to a depth of not less than 7,500 ft., drilling to start not later than December 19, 1946.

Anson et al are planning a deep wildcat test between Hodge and Quitman in Jackson Parish, and the California Co. has made a wildcat location west of Jonesboro in the same parish. Phillips Petroleum Co. is preparing to perforate casing at 6,381 ft. for a test of 1 Nabors, 28-12n-14w, De Soto Parish, acquired from the Kerr-McGee Oil Co., a prospective gas-distillate discovery.

In Richland Parish, Skelly Oil Co. 4 Myrtle Hubbard, 34-17n-8e, flowed 7 bbl. oil per hour through ⅛-in. choke from perforations at 3,076-84 ft. Hope Production Co. 1 Davis, 3-17n-8w of Webster Parish, has scheduled drilling of a Travis Peak test; also planning to test the Travis Peak, Skelly Oil Co. is preparing to drill a wildcat, 1 Whitney, in 1-9n-14w, of Sabine Parish.

In South Arkansas, T. W. Murray and Garland Anthony 1 Beck, 33-15s-26w, Miller County, has shown small amounts of oil, and attempts are being made to complete the well commercially. Successful wildcats include Charles F. Steele 1 H. L. Waters, 20-14s-21w, in Nevada County, pumping approximately 7 bbl. oil per day, and H. E. Wasson A-1 Union Sawmill, 8-18s-12w, in Union County, pumping periodically 2 bbl. oil per day and still testing. Apperson & Sherwood have staked a new test, to be known as 1 Alston, in 30-10s-27w of Howard County. In Bradley County, American Liberty Oil Co. 1 Bradley, 15-13s-9w, is drilling ahead at 3,660 ft.

Hatteras Test Gets Granite at 9,910 Ft.

STANDARD Oil Co. (N. J.) 1 Hatteras, wildcat test drilled on Cape Hatteras, North Carolina, drilled to a total depth of 10,054 ft., and ran electric log, which checked the top of the granite at 9,910 ft. The well will be plugged, but during the plugging back operations, an attempt will be made to secure a sample of the formation water in the Black Creek sand (Middle to Upper Cretaceous) at 4,100 ft. A good sand body was found here and the geologists want to get as much information as possible about the salinity and other prop-

erties of the connate water, for possible clues in subsequent tests in this region.

OKLAHOMA

Major County Wildcat Coring Saturated Lime

WILCOX OIL CO. et al 1 Coulter, SW NW 15-22n-9w, was creating considerable interest at the close of the week after a core showed porosity and staining in an oolitic limestone, and cuttings showed additional staining and oil odor.

The first 2 ft. of a 10½-ft. core recovered from 6,610-22 ft. was an oolitic lime with good staining and oil odor, and was considered a very good show. Remainder of the core was shaly and tight. Further staining and porosity were encountered at 6,629 ft., and operators ordered a 15-ft. core cut at 6,631 ft.

The 1 Coulter is in the Major County section of the Anadarko Basin and about 15 miles northeast of Superior 1 Ringwood, a recent discovery which made 30 bbl. a day from the Manning sand of Pennsylvanian age. The Coulter well is correlated as running approximately 190 ft. higher than the Superior well, but if the lime now being cored is in the Mississippi, as some geologists believe, it has completely missed the pay section found in the latter well.

Hope of many Holdenville oil operators that a good oil field might some day be opened near that town was apparently realized last week when I. V. Horner et al 1 Williams, SW NW NW 6-7n-9e, came in flowing at the rate of 150 bbl. of oil and 5,000,000 cu. ft. of gas daily. Pay zone was the Booch sand at 2,772-2,802 ft., total depth 2,820 ft.

When originally drilled in, the 1 Williams showed for 1,500,000 cu. ft. of gas plus a slight show of oil daily. Following a 60-qt. shot, however, the well flowed the 150 bbl. of oil and the gas flow was increased to nearly 5,000,000 cu. ft.

Results of exploratory drilling along the eastern rim of the Anadarko Basin appeared disappointing at the close of the week. In Eastern Grady County, George P. Livermore 1 Giles Ranch, NW NW 35-8n-5w, was last reported drilling ahead at 12,153 ft. in hard, tight sand. Gassy oil-cut mud was recovered on a drill-stem test at 11,980-12,110 ft. and the formation softened at 12,126 ft., but there was no recovery from a core at 12,126-27 ft. Operator is expected to plug back and test up the hole in the Hunton and Viola after exploring the Bromide.

The Carter Oil Co. has written off two of the tests in their McClain County exploration program as dry holes. The 1 Bingham, SE SW 3-7n-3w, 1 mile east of the Washington pool discovery, ceased drilling at 10,687 ft. after a drill-stem test of the Bromide at 10,661-75 ft. recovered only salt water. The 1 Mary Mottinger, NW SW 5-6n-3w, ½ mile south of the Iron Chapel discovery, was finaled at 11,006 ft. After acid treatment, the 1 Mottinger flowed oil erratically through perforations opposite the Hunton lime at 9,967-10,030 ft., but the flow declined to the point where the operators decided it was not commercial.

In eastern Dewey County, the Oklahoma Natural Gas Co. 1 Oakwood Unit, NW NW 6-17n-14w, has resumed drilling after a shutdown for repairs at 10,991 ft. Present plans call for taking the well down to 12,000 ft. or even deeper.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: Davon Oil Co. 1 McVey "C," NE NW NE 29-15n-7e, 3,860,000 cu. ft. gas from Oswego at 2,810 ft. and Verdigris at 2,880 ft., Perry sand 1,390 ft., Layton 1,730 ft., Cleveland 2,060 ft., Inola 3,260 ft., Bartlesville 3,275 ft.,

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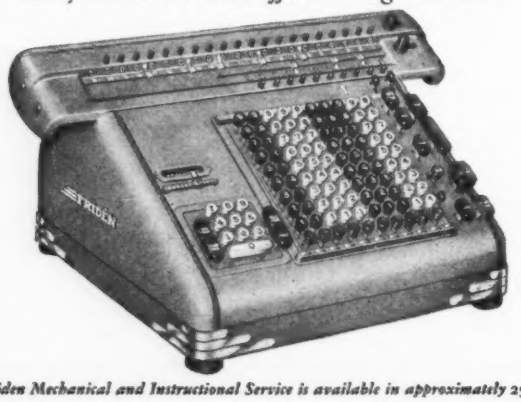

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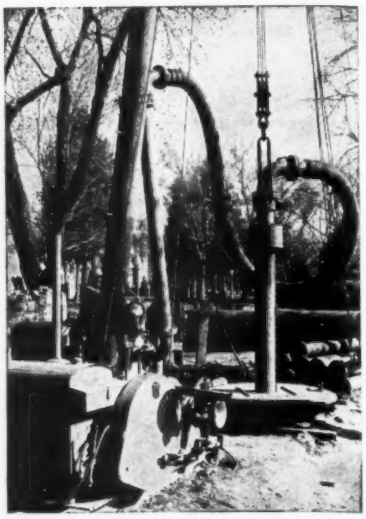

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Lincoln County: Fred Morgan Drilling Contr. 1-A P. Cash, NE NE SW 6-14n-4e, flowed 223 bbl. oil per day through 17/64-in. tubing choke from Oswego at 3,910-58 ft., Checkerboard 3,278 ft., Cleveland 3,305 ft., Red Fork 4,305-09 ft. and 4,345 ft., TD 4,349 ft.

Okfuskee County: Wilcox 1 J. W. Callahan, SE SE NE 24-12n-9e, flowed 14,000,000 cu. ft. gas from Hunton at 3,668 ft., Oswego 1,402-18 ft., Verdigris 1,758 ft., Inola 2,380 ft., Bartlesville 2,483 ft., Woodford 3,649 ft., TD 3,696 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: Beck & Johnson 1 J. W. Storer, SE NE NE 10-1n-10w, dry, TD 1,495 ft., no tops reported.

Creek County: W. N. Dunn 1 Walker "B," NW NW SE 30-14n-10e, dry, TD 3,606 ft., no tops reported.

Garvin County: British-American Oil Producing Co. 1 Guthrie, NW NW SE 7-3n-2w, dry, TD 7,452 ft., sandy lime 4,670 ft., sand 6,494 ft., Viola dense 6,946 ft., Simpson 7,128 ft., second Bromide sand 7,412-34 ft.

Mid-Continent Petroleum Corp. 1 F. S. Davenport, NE NE NW 28-4n-2w, dry, TD 6,838 ft., sand 5,899 ft., sand 6,009-30 ft. with stain of oil at 6,013-30 ft.

Lincoln County: Ryan Consol. 1 Nickell, NE NW SE 17-14n-5e, dry, TD 3,540 ft., Layton 2,472-2,500 ft., Cleveland 2,725 ft., Oswego 3,434-67 ft., sand 3,489 ft.

Okfuskee County: Geo. Martin & W. C. Mcbride 1 J. L. East, SE SW SW 15-12n-10e, dry, TD 3,035 ft., Bartlesville 2,153-90 ft., Booch 2,553-74 ft., slight show of gas from Cromwell at 2,997 ft.

Osage County: D. B. Mason No. 1-A, SW NE NW 10-24n-12e, dry, TD 1,643 ft., Oswego 1,139-1,212 ft., sand 1,542-1,631 ft.

KANSAS

Pipe Set to Test Rice County Wildcat

PIPE is being run to test good oil saturation found in the Phil-Han Oil Co. et al 1 Schoonover, SE SW SW 21-18s-9w, semi-wildcat test in northwestern Rice County. Good saturation, stain and odor were logged in the top of the Arbuckle lime at 1,519 ft. subsea. The test is about ¾ mile southwest of production in the Rickard pool and is on a block of 800 acres recently acquired by Phil-Han and Bud Dozier.

Anderson-Prichard Oil Co. has apparently given McPherson County its first deep oil pay with the 5 Schulz, NE NW NW 15-18s-1w, in the heart of the Paden pool. This well encountered a good oil show in the Viola lime, and is also showing for a commercial producer from the Chat. Testing is now under way but no gage has yet been made available.

Another important strike during the past week was the Virginia Drilling Co. 2 Roberts, SW SW 14-21s-12w, Stafford County wildcat. Good showings of oil and gas were encountered in the Arbuckle at 3,546-51 ft., total depth. Testing is now under way.

Champlin Refining Co. has extended gas production in the Deerhead pool ½ mile to the northeast with the 1 Larkin, SW NE 32-32s-15w. The 1 Larkin has been completed for 40,000,000 cu. ft. of gas daily on an open flow test from the Maquoketa at 4,958-89 ft.

A new Simpson sand oil discovery is in prospect for southwestern Butler County where the J. P. Gaty 1 Schowalter, NE NW SW 23-28s-3e, 3 miles west of the Augusta pool, is scheduled to drill plug this week after getting a good oil show in the Simpson at 3,001-03 ft. The hole filled with 1,000 ft. of oil during a 24-hour period when the well was shut down to await pipe. The 1 Schowalter is reported 15 ft. higher structurally on the Simpson than several dry holes in the area. Based on the show found in this test, Gaty is planning to reopen a dry hole recently completed in SE SW NE 14-28s-3e, and which had the Lansing at 2,205 ft., higher than the Schowalter prospect.

KANSAS WILDCAT FAILURES

Cowley County: Earl Wakefield 1 Ogilbee, SW NE NE 7-32s-4e, dry, TD 3,348 ft., no tops reported.

Ellsworth County: Phil-Han Oil Co. 1 Rathburn, SW SW NW 16-17s-8w, dry, TD 3,445 ft., Kansas City 2,851 ft., Maquoketa dolomite 3,247 ft., Simpson 3,382 ft., Arbuckle 3,427 ft.

Graham County: Potash Co. of America 1 T. E. Logue, SW SW NW 17-6s-24w, dry, TD 4,255 ft., Topeka 3,529 ft., Kansas City 3,726 ft., base Kansas City 3,929 ft., conglomerate 4,155 ft., Arbuckle 4,205 ft.

Morris County: F. G. Holl et al 1 Clark, NW SW NE 7-17s-5e, dry, TD 2,535 ft., Mississippi lime 2,305 ft., Viola 2,525 ft.

MISSISSIPPI

Five New Wildcats to Drill in Mississippi

JACKSON.—Five new wildcat locations in four counties were reported last week. In Wayne County, I. P. LaRue will drill two wells on geophysical prospects; Humble Oil & Refining Co. will drill one well approximately 5½ miles southwest of the Fayette field in Jefferson County, and one well in Greene County. The latter location was not announced. The fifth well will be for Sohio on its Yazoo City block, with contract let to Roeser & Pendleton.

In the Brookhaven field, Lincoln County, Roeser & Pendleton requested permits for two wells as a start on the 24-well continuous-drilling farmout deal with Sun Oil Co. Locations are for the 1 Cora Ballard, SW SW 17-7n-7e, where rig is being moved in; and the 1 Zollie Case, SE NW 18-7n-7e. Farmouts from Sun to Roeser & Pendleton include 24 leases totaling nearly 2,400 acres. East lease is to get a test.

In Walton County, Florida, R. D. Logan, Trustee, 1 Walton Land & Timber Co., in 14-1n-18w, was reported dry at 6,500 ft. in the Comanche zone. Side-wall samples were said to have shown only a slight oil odor and stain in a tight shaly chalk section at 3,792-3,812 ft.

MICHIGAN

New Monterey Pool May Equal Original Field

SAGINAW.—Prospects of the New Monterey pool in Allegan County of South Michigan becoming an important area were heightened last week when two outpost wells showed for good producers.

W. Spencer Cook 6 Brenner, SE SW NE 15-3n-13w, flowed 800 bbl. of oil a day on tests before being pinched in to its allocated 125 bbl. daily production.

The second well, nearly ½ mile south of the 6 Brenner, was C. W. Cook and Leonard C. Sleep 1 Reynolds, NE SE SW 15-3n-13w, which flowed at the rate of 225-250 bbl. a day after acid treatment.

Also in Allegan County, some 3 miles northwest of the Casco pool, J. E. Hood's wildcat, 1 Taylor, NE SW SE 20-1n-16w, became a definite new pool prospect when it filled with oil and made 15 bbl. of oil in 12 hours. Traverse lime was topped at 1,101 ft., with pay at 1,103 ft.

What Others Say

(Continued from page 79)

Interference data may be of one of two general types:

1. Effect of one well on the producing rate of another. This is usually limited to closely spaced wells.

2. Interference as reflected by changes or variations of bottom-hole pressure of one or more wells as influenced by the producing of other nearby wells.

It is seldom with present spacing that interference can be determined under Condition No. 1 above. Therefore, our discussion will be limited to Condition No. 2.

Examples of interference as determined by bottom-hole-pressure data include the following:

1. Interference tests conducted where a center well is shut down and the surrounding offset wells are produced. If the bottom-hole pressure of the center well is reduced while the offset wells are producing, interference has been established between one or more of the offset wells and the center well; however, the direction of the path of the interference may not be known.

2. Interference tests conducted where the center well is produced and the offset wells are shut down. If the production of the center well results in the reduction of pressure in one or more of the surrounding wells, then interference has occurred between the center well and the offset well or wells where the pressure is reduced.

3. Interference is also often noted during development operations in the fields which are primarily under volumetric control. It is often found that wells drilled after a field has started producing will have initial bottom-hole pressures which are less than the original bottom-hole pressure, indicating interference or drainage.

What do interference tests as determined from bottom-hole pressure or fluid-level instruments indicate? The differences in opinion in regard to the above question may be summarized as follows:

1. Interference determined between wells indicates only that the wells where interference exists are in the same common reservoir.

2. Interference may occur through the water zone in a water-drive reservoir and will not necessarily result in the movement of oil between wells where interference exists.

3. Interference between wells will indicate that movement of fluid will occur from areas of high pressure to areas of lower pressure. The amount of movement of fluid will depend upon reservoir characteristics such as the pressure differential, viscosity of the fluid, and distribution of permeability in the reservoir rock. Interference alone is not a complete index of recovery efficiency.

4. The results of a series of interference tests can be used to depict the reservoir permeability pattern in the area tested.

5. The presence of a gas phase in a reservoir will reduce the possibility of measuring any degree of interference in the normal manner due to the expansion of the gas when the pressure is drawn down. This condition will tend to limit the application of interference tests to reservoirs which are undersaturated and operating at bottom-hole pressures below the bubble-point pressure.

In limestone reservoirs such as the Arbuckle there is such a wide variation in porosity and permeability due to the hetrogeneous nature of the limestone itself that even the best of core data are not representative of the producing formation. An intensive study by means of interference tests will often develop information in a reservoir of this type that is usually not obtainable by any other known method.

L. E. ELKINS.
Assistant chief production engineer, Stanolind Oil & Gas Co., Tulsa.

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Among the

Drilling Contractors

John H. Saye, Pennville, Ind., is drilling contractor on the George and Virginia Gates 1 fee, in NW NE 18-21n-11e, Delaware County, Indiana.

Fred M. Manning, Denver, who operates 30 rotary rigs, is drilling below 700 ft. at 1 Dreiling, in NW NW SW 21-14-16, a new wildcat operation in southeastern Ellis County, Kansas, 2½ miles southeast of Victoria.

R. L. Baumann Drilling Co., Dallas, will contract three wells for Max Pray, of Chicago, locations for which will be made shortly east and northeast of the North Lindsay pool in Oklahoma. Pray has acquired leases on three tracts totaling 370 acres.

Ashby Drilling Co. has been awarded drilling contract on the Panhandle Eastern Pipe Line Co. 6 Leslie T. Muse et al Comm., in C SE 12-16n-11w, Newaygo County, Michigan.

Wofford, Nicholson & Rose Drilling Co., Tulsa, was drilling below 1,500 ft. at its outpost test south of the Kendrick pool in Lincoln County, Oklahoma. The test, the 1 Naylor, is located in NW SW NE 7-15n-5e, ½ mile from the pool. It is a Prue sand project but may go to the Wilcox.

Loual Drilling Co. has recently assembled a group of leases 4 miles east of Ardmore, in Carter County, southern Oklahoma. These acquisitions were in Sections 24 and 25 4s-2e and in 19-4s-3e.

Ray Ash, Van Buren, Ind., is contractor on the Joseph Minneci 2 Ida M. Voraw, in NE NE 12-27n-5e, Wabash County, Indiana.

Iron Drilling Co. has staked location for an Arbuckle test in SE SE SW 24-19-9w, Rice County, Kansas. The test is the 1 Hoyt, and it is in the northwestern part of the county, 1 mile southeast of production in the Chase pool.

J. E. Trigg is contractor in charge of the Coline Oil Co. 1 Cooper-Johnson, in SE NW SE 1-2n-8w, in the Marlow pool of Oklahoma, which drilled in around 8,370 ft. Trigg also holds contract on the E. A. Benson and W. V. Montin 1 Amos Marriott, in NE NE 23-15n-5w, on west edge of extreme north end of the West Edmond field in Kingfisher County, Oklahoma.

S. L. Godfrey is contractor on the P. F. Broughton 1 Wilfred & Nellie Dandel Comm., in NE NW SW 27-3n-13w, Allegan County, Michigan.

Gillespie & Sons, contractors on the Ray L. Kemp and Midland Co-Op. 1 Wilson, in SW SW SW 20-16n-5e, Lincoln County, Oklahoma, was drilling below 1,500 ft.

W. C. Taggert is drilling contractor on the Michigan Consolidated Gas Co. 1 S. Medler et al, in C NW 10-10n-9w, Kent County, Michigan.

Deep Fork Drilling Co. is using steam rig on the Haddock & Gaskill 1 Harrison, in SE NW NW 19-7n-6e,

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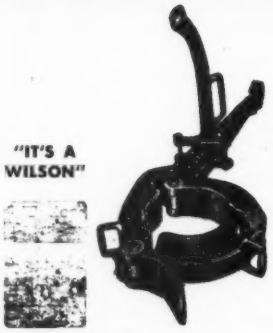

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Seminole County, Oklahoma, which was drilling below 1,300 ft. This is a test to the Wilcox.

Robert W. Atha is drilling contractor on the Gulf Refining Co. 1 Lunden Estate, in SW NE SW 36-15n-4e, Bay County, Michigan.

Cox Drilling Co. has been awarded drilling contract on the Ellis, Moorison & Bement 9 J. N. Davidson, in NW SW 26-1n-9w, Pike County, Indiana.

Ajax Drilling Co. is drilling contractor on the C. L. Maguire, Inc.-Russell E. Fletcher-T. R. Russell 1 Carl Smith, in NE NW NW 22-14n-8w, Mecosta County, Michigan.

Ray Delaney is contractor on the Sam King 4 Earlabaugh, in NE SE NE 34-13n-5e, Lincoln County, Oklahoma, which was drilling below 2,250 ft.

Calvert-Willis Drilling Co. is contractor on the Sells Petroleum Co., Inc., 1 Elmer E. Elliott, in NE SE 24-5s-14w, Posey County, Indiana.

Hagan & Hagan are contractors on the Ward Oil Co. and Rawmor Corp. 7 Shephard, in NW SW NW 4-20n-4e, Arenac County, Michigan.

Harry Stroud has been awarded drilling contract on the Michigan Devonian Petroleum Co. 1 Joe and Josephine Niemczyk, in NE NE NE 31-4n-12w, Allegan County, Michigan.

Jackson Drilling Co. holds contract on the W. C. McBride, Inc. 1 Lochner, in SW SE SE 7-15n-4e, Lincoln County, Oklahoma, north of the Chandler pool, which was drilling below 3,200 ft.

Goll, Graves & Mechling, Inc. have been awarded drilling contract on the Basin Oil Co. 1 Kircher-Porter, in C N½ NE SE 2-14n-4e, Bay County, Michigan.

M. R. Walton Heads New Firm of Consultants

Organization of M. R. Walton and Associates with headquarters at Silver City, N. M., has been announced. This firm of consultants is headed by M. R. Walton, well known in the United States and abroad as engineer and oil-industry sales director for Arthur G. McKee Co. for many years.

The new firm accepts commissions and assignments in the oil industry in refining, distribution, and transportation of oil; in the iron and steel industry and in the mining industry, ferrous, nonferrous and nonmetal mining problems. Assignments in Latin American countries also are undertaken.

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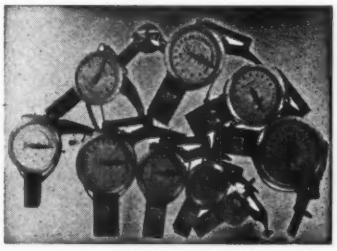

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PERSONALS

Shell Oil Executive Began as Gager At Wood River

HORACE D. DALE'S career with Shell Oil Co. Inc., spans a 22-year period during which he has risen from a gager's job at the company's Wood River, Ill., refinery to assistant to the vice president of the manufacturing department in New York.

Dale joined Shell following his graduation from the University of Pittsburgh in 1924. He is a native of Titusville, Pa. At Wood River, he moved up through various positions to head stillman, and in 1933 he became head technologist at the refinery.

A year later, he became assistant superintendent in charge of topping and cracking, and in 1936, assistant superintendent in charge of lube oils. He assisted in correlating the design and engineering of the extension of the plant in 1940 and 1941, and later in 1941, he was made refinery superintendent. In 1944, he was shifted to New York as manager of the operations department. Earlier this year, he became assistant to the manufacturing department vice president.

Last February, Dale was loaned by Shell to the War Department to assist in the survey of the results of strategic bombing in Europe. Last autumn, he performed similar duties in Japan where he inspected the results of the atomic bombing of Nagasaki and Hiroshima.

C. L. Hulswitt, John W. Lesch and **Kenneth E. Campbell,** have been added to Warren Petroleum Corp.'s liquefied petroleum gas division as sales engineers. Hulswitt will be in charge of the Detroit office; Lesch and Campbell will be located in Tulsa.

Torkild Rieber, president of Barber Asphalt Corp., and former president of The Texas Co., has been elected a director of TACA Airways, S. A.

T. M. Glass, former geologist for Sinclair Prairie Oil Co. at Amarillo, Tex., has joined Eason Oil Co. as district geologist at Mount Vernon, Ill.

G. A. Berg, formerly chief geophysicist for Standard Oil Co. of Texas, has resigned to head his own organization, Berg Geophysical Co., with offices in Houston. Berg had been with Texas Standard company for the last 10 years.

E. W. Buelow, a member of the pipe-line department of Humble Oil & Refining Co., has assumed the duties of mechanical safety supervisor of the division in an extensive safety training program for department supervisors.

Leonard T. Wilson, technical assistant in the head office of Shell Oil Co., Inc., in San Francisco, has been made assistant department manager, catalytic cracking, at the Wilmington, Calif., refinery. In another change in Shell's manufacturing department, **Charles Robinson,** department manager, marine loading station at Wilmington, has taken a similar post at the Martinez, Calif., plant. In Shell's production department, **Donald S. Nutter,** senior exploitation engineer, at Long Beach, has been transferred to the San Joaquin division at Bakersfield. In Shell Development Co., **Thomas N. Ravn,** engineer at San Francisco, has been transferred to Emeryville, Calif. In Shell Chemical Corp., changes included **G. J. DeJong,** technical assistant at Shell Point, named engineer at Shell Point; **D. B. Finch,** technical assistant at Martinez, named assistant department manager at Martinez; **N. L. Gianakos,** chemist at Torrance, transferred to Houston; **C. A. Houston,** junior chemist at Martinez, named junior technologist at the head office; **V. L. Deldsen,** assistant department head at Martinez, named depart manager at Houston.

Charles F. Roeser, president of Roeser & Pendleton, Inc., Fort Worth, has accepted a trusteeship of Marietta, Ohio, College.

W. B. Moore, research geologist with Atlantic Refining Co., has been promoted to regional geologist and transferred from Houston to Dallas.

Robert Knox, formerly with the Kansas Geological Survey at Lawrence, has joined Sinclair Wyoming Oil Co. in the Illinois Basin area.

Leo Van Dijk, oil field engineer for Asiatic Petroleum Corp., is scheduled to leave New York City, where he was stationed during the war, for the Netherlands East Indies.

Earl Brinton and **"Corky" Volway,** recently engaged in Shell Exploration Co.'s drilling operations in the Jumping Pound area of Alberta, are leaving shortly for Borneo. **Merrill Cairns,** also employed by Shell, will leave soon for Venezuela.

B. R. Cunningham, general drilling superintendent for Caribbean Petroleum Co., is convalescing in New York following an operation. Before returning to Venezuela he will spend three months in Houston and Los Angeles.

James Parker, recently released Army colonel, has returned to Arrow Drilling Co. as agent for the West Texas-New Mexico area, the position he held before he was called to active duty. Now at Abilene, Parker expects to move to Midland later.

Charles R. Criss, petroleum engineer for Sohio Petroleum Co., has been transferred from the Cleveland offices to the Michigan division where he will work in the engineering department of the production division as assistant to **J. E. Buckley,** district engineer.

James H. Wright, former colonel on the Army-Navy Petroleum Board and petroleum officer of the European theater during the war, has been appointed assistant to Coastal Oil Co.'s Vice President **Wiley H. Butler,** who is in charge of operations. Wright's last Army job was as deputy director of the fuel and lubricants division of the Quartermaster Corps.

F. Orduna, director of Empress Nacional Calvo Satelo, Madrid, Spain, has returned to his country after a trip to New York.

William H. Dennis has been appointed treasurer and comptroller of Pathfinder Petroleum Corp., according to an announcement by **Bert F. Devere,** president.

L. G. Greer, construction superintendent for United Gas Corp., has been retired by the company. He began his career in the gas industry in 1916, working for Atlanta Gas Light Co. and El Paso Gas Co. He was for many years maintenance superintendent in charge of United Gas properties in Texas, Louisiana, and Mississippi.

P. B. Nichols, Oklahoma City, has resigned as district geologist for Cities Service Oil Co. to become president of the Geolograph Co. in Oklahoma City.

H. W. Fisher, member of the board of directors, Standard Oil Co. (N. J.) and **D. A. Shepard,** chairman of the board of Anglo-American Oil Co., Ltd., accompanied Air Chief Marshal **Sir Wilfred Rhodes Freeman** on a recent inspection tour of Standard's refinery installations at Baton Rouge, La. Freeman was chief executive of the British ministry of aircraft production from 1942 to 1945 and was closely connected with the British use of 100-octane gasoline.

H. C. Teasdel, vice president and secretary-treasurer of the California Co., New Orleans, has been elected to membership in the Controllers Institute of America, a technical and professional organization devoted to improvement of controllership procedure.

C. R. Lawrence, formerly with the American Gas Association's testing laboratories in Cleveland, Ohio, has been appointed general superintendent of operations in Atlanta for Atlanta Gas Light Co., succeeding **W. H. Ligon** who resigned to become president of Nashville Gas & Heating Co., Nashville, Tenn.

Henry G. Symonds, president of Tennessee Gas & Transmission Co., has been elected a director of the National Bank of Commerce in Houston.

Charles P. Baker has been appointed general superintendent of the East St. Louis refinery of Socony-Vacuum Oil Co., Inc. Baker moved to the East St. Louis plant in January, as assistant plant manager, from the Magnolia Petroleum Co. refinery at Beaumont, Tex.

Edward Trostell, petroleum engineer associated with DeGolyer & MacNaughton, was in California on business last week but was to return to his office in Dallas within another few days. Trostell prior to the war was with the Union Oil Co. and joined DeGolyer & MacNaughton after leaving Petroleum Administration for War.

Gene Keenard has been elected vice president of Keenard Oil Co., Inc., Evansville, Ind., and will be in charge of the geological department. He recently completed his service as a lieutenant in the Navy.

Richard J. Alesch has been made director of personnel of the Robinson, Ill., refinery of Ohio Oil Co.

Harold R. Pauley, executive vice president of Petrol Corp., and brother of **Edwin Pauley,** former Democratic national treasurer, has been elected to the board of governors of the Los Angeles Propeller Club.

J. A. Adamson, bunkering manager of Asiatic Petroleum Corp., recently returned to the United States after several weeks in London.

Joseph L. Quinn, head of the Fort Worth district land office of Warren Petroleum Corp., has been transferred to Wichita Falls, Tex., where he is in charge of the North Texas district land office of Hanlon-Buchanan, Inc., which was recently purchased by Warren. Quinn formerly was chief of the scouting department of the Texas producing division of Pure Oil Co. in Fort Worth.

C. M. Crebbs, president, and **Dr. Hollis Hedberg,** assistant chief geologist, Mene Grande Oil Co., S. A. (Gulf), were recently in New York on vacation from their Caracas headquarters.

A. M. Perley, Oregon district lubrication engineer for Tide Water Associated Oil Co., was elected secretary of the Oregon chapter of the Society of Automotive Engineers at a recent meeting.

John P. Vezzetti, vice president and treasurer, Sunset Oil Co., has been elected president of the Petroleum Accountants Society in Los Angeles for the 1946-47 fiscal year. Other new officers are **K. D. Vandervort,** Amerada Petroleum Corp., first vice president; **John F. Baumgaertner,** Ohio Oil Co., second vice president; and **E. C. Rogers,** Union Oil Co., second vice president.

A. L. Hall has resigned as evaluation engineer with Phillips Petroleum Co., Bartlesville, Okla., to become petroleum engineer for Reno Oil Co. at Wichita Falls, Tex. During the war, Hall was a lieutenant in the U. S. Navy, dealing with petroleum procurement matters on the East Coast and in South America.

D. C. ROGERS, JR.

Dale C. Rogers, Jr., has been appointed advertising and sales promotion manager of Mid-Continent Petroleum Corp., according to **R. W. McDowell,** vice president in charge of sales. He fills a vacancy resulting from the death of A. P. McGrath last January. Rogers was a vice president of Rogers-Gano agency, Houston, prior to service in the Marine Corps. Upon discharge, he became associated with the Ratcliffe agency, Dallas.

SHIFTS—

James J. Dolan, engineer, Standard Oil Co. of California, Inglewood, Calif., to Whittier, Calif.; **Charles R. Dodson,** engineer, Standard Oil Co. of California, San Carlos, Calif., to Taft, Calif.; **Steve Thomas,** superintendent, Rocky Mountain Drilling Co., Riverside, Calif., to Rock Springs, Wyo.; **George D. Rhoads,** superintendent, Trinity Gas Corp., Hebbronville, Tex., to Realitos, Tex.; **A. N. Eby,** engineer, Superior Oil Co., Bellaire, Tex., to Abbeville, La.; **Walter Kiley,** district manager, Warren Petroleum Co., Houston, Tex., to Galena Park, Tex.; **Cecil S. Thomas,** engineer, Pan-American Pipe Line Co., Longview, Tex., to Crosby, Tex.; **J. A. Webb,** superintendent, Lucey Petroleum Co., San Antonio, Tex., to Mt. Pleasant, Tex.; **Fraser H. Allen,** engineer, Stanolind Oil & Gas Co., Washington, D. C., to Upper Montclair, N. J.; **Joseph P. Lyons,** engineer, E. B. Badger & Sons Co., Hammond, Ind., to Wichita, Kans.; **Aubrey A. Morgan,** geologist, Stanolind Oil & Gas Co., Collins, Miss., to Hattiesburg, Miss.; **Melvin Straube,** engineer, Phillips Petroleum Co., Kansas City, Mo., to Sterling, Neb.; **Walter W. Taylor,** vice president, Petroleum Exploration Co., New York, to Hamilton, Bermuda; **James W. Walker,** engineer, Lummus Co., Rego Park, L. I., N. Y., to Wilmington, Del.; **Charles R. Criss,** engineer, Sohio Petroleum Co., Rocky River, Ohio, to Mt. Pleasant, Mich.; **H. C. O. Clarke,** manager, Pure Oil Co., Billings, Mont., to Olney, Ill.; **C. R. Duncan,** superintendent, Ashland Oil & Refining Co., Inc., Henderson, Ky., to Childress, Tex.; **C. R. Hetzer,** vice president, Mountain Fuel Supply Co., Rock Springs, Wyo., to Salt Lake City, Utah; **K. P. Huffman,** engineer, Sohio Petroleum Co., Davis, Okla., to Edmond, Okla.; **W. S. McCready,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Eureka, Kans.; **J. L. Smith,** engineer, Continental Pipe Line Co., Oklahoma City, to Shawnee, Okla.

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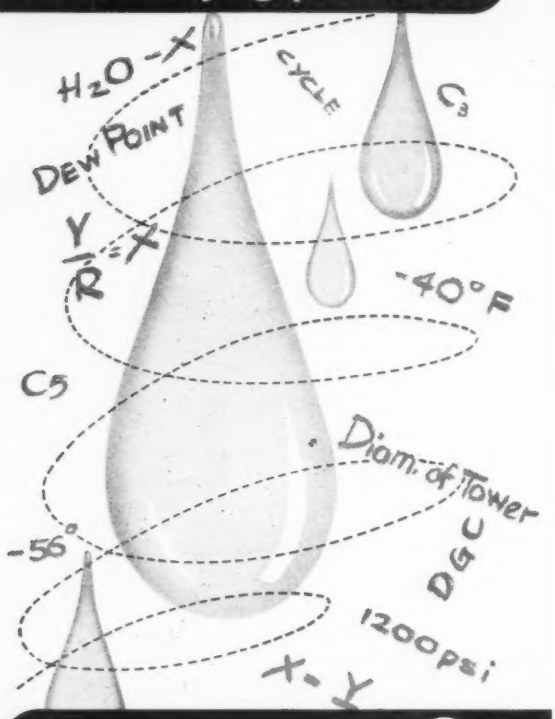

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For instance, Driocel has exhibited a D.G.C. of approximately 10% when drying wet gas feeds presenting appreciable temperature, pressure and moisture ranges. Driocel produces dried gases of extremely low dew-point, below −57° F. What's more, its D.G.C. value is little affected by repeated regeneration. Driocel is just as efficient in the drying of hydrocarbon liquids, liquid organic chemicals, electrical oils, hydrogen, hydrogen sulfide and compressed air.

Reasons? Driocel is a "tool" built to do a job, by engineers who fully understand the function of a desiccant. It's made from selected bauxite ore, specially processed to insure high moisture adsorption and low iron content.

If you are faced with a drying problem, old or new, look into the merits of Driocel. It will perform a surprising job in most applications. And, you can be sure of sound advice on drying procedure when you write:

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Equipment Men in the News

Dingley Retires as Marmon-Herrington President; Klausmeyer to Succeed

A. W. Herrington, chairman of the board of directors of Marmon-Herrington Co., Inc., Indianapolis, announces that Bert

BERT DINGLEY

D. M. KLAUSMEYER

Dingley has retired as president of the company. He is succeeded by David M. Klausmeyer, who has resigned as plant manager of Chevrolet Commercial Body Division of General Motors Corp. to join the Marmon-Herrington organization. Dingley joined Marmon-Herrington in 1932 as vice president, just a few months after the company was founded. This position he held until August 1942, when he was elected president of the company.

In succeeding Dingley David M. Klausmeyer is well qualified both by education and experience for this position. A mechanical engineer by profession, he has been identified with the automotive industry all of his business life. He joined the Chevrolet Division of General Motors in 1924, after spending 3 years in body design and manufacture with various factories, and remained with that division continuously for 22 years.

Chandler Transferred by Axelson

E. L. CHANDLER

Axelson Manufacturing Co. announces the transfer of Earl L. Chandler from the Eastern division to the Dallas district. Chandler has been connected with Axelson since 1926 and through the period of the past 20 years has worked in many of the Mid-Continent divisions. William A. (Bill) Russell is assuming the district vacated.

Kirberger to Latin America

R. E. KIRBERGER

R. E. Kirberger, sales manager for Franks Manufacturing Corp., Tulsa, left Miami late in June for an extended tour of the South American oil fields. The trip is in the nature of a survey of the needs for drilling and servicing equipment in the major oil-producing areas of Latin America, and will include educational presentations in the use of portable oil-field equipment. A number of movie films will be used, showing the operation of portable drilling and servicing units.

Kirberger's itinerary includes Trinidad, Barranquilla, Bogota, Caripita, Maracaibo, El Centro, and other points in Venezuela, Colombia, and other oil-producing nations in South America.

Koch Named to Sales Position With Hammel-Dahl

The Hammel-Dahl Co., Providence, announces the appointment of Arthur J. Koch as assistant sales manager. Koch was employed for several years as a chemist and test engineer at Jones & Laughlin Steel Corp. He then joined Mason Neilan Regulator Co. in the field of automatic control instruments, with which he has since been connected for some 10 years.

Letsinger Retires as Vice President Of Cummins Engine Co.

Paris E. Letsinger, for years an outstanding figure in diesel engine industry, has been elected a director of Cummins Engine Co., Inc., Columbus, Ind. His appointment, which followed his retirement as vice president in charge of distribution because of his health, was announced by C. L. Cummins, president.

P. E. LETSINGER

McGivern Becomes Sales Manager For McKissick Products Corp.

McKissick Products Corp., Tulsa, has announced appointment of Paul V. McGivern as sales manager. McGivern has been associated in the oil-field supply and specialty business for over 30 years. He was employed by the National Supply Co. for 11 years and for the past 21 years by the Baker Oil Tool Co.

Insurance Company Enters Field of Oil Loans

Southwestern Life Insurance Co. has entered the field of oil loans, offering the service and facilities of its loan department to the fraternity, according to C. F. O'Donnell, of Dallas, president. While this is a new field of loans for this company, O'Donnell said that Southwestern Life has for years been cognizant of the significance of the oil business to the development of Texas.

Miller, Merkert Join Cummins Diesel Sales Engineering Staff

Norman E. Palmer, general sales manager of Cummins Engine Co., Inc., Columbus, Ind., has announced the appointment of Paul Merkert, Jr., and Robert Miller to the Cummins sales engineering staff. Both Merkert and Miller joined the Cummins company upon their release from active duty with the U. S. Navy.

Wood Joins the American Coach & Body Co.

Clarence G. Wood, former head of his own distributing organization handling machine tools and abrasive disks, has joined The American Coach & Body Co. as manager of sales promotion. Released from the service in November 1945, Wood proceeded to set up a distributing organization handling machine tools and abrasive disks, and on April 15 he became associated with American Coach & Body.

Lundberg Gets New Post With Caterpillar Tractor

George T. Lundberg, for the past several years supervisor of transmission design in the engineering department of Caterpillar Tractor Co., has been named assistant to H. S. Eberhard, vice president in charge of manufacturing, engineering, research, and training. N. E. Risk, who is responsible for supervision of all engineering and coordinated activity pertaining to the application of allied equipment and special attachments, will also assume supervision of transmission design.

Trout on A.G.M.A. Executive Committee

Walter W. Trout, vice president and general manager of Lufkin Foundry & Machine Co., was elected member of the executive committee of the American Gear Manufacturers Association at its 30th annual meeting held in Hot Springs, Va., on June 3.

Parker Appliance Makes Changes

Two appointments in the sales organization of Parker Appliance Co., Cleveland, are announced. Fred E. Amon relinquishes his position as general sales manager to devote his full time as manager of aircraft sales to serving this important part of the company's present and prospective business. Dan W. Holmes, formerly with Weatherhead Co., joins Parker Appliance as general sales manager.

McLemore Joins Well Explosives

Col. Robert M. McLemore, just relieved from active duty with the Army Air Corps, has announced his association with Well Explosives, Inc., Fort Worth, as vice president and general manager. Before being called to active duty, he was associated with Sun Co., Dallas.

Bethlehem Opens New Store

Bethlehem Supply Co. has opened a new store at Eunice, La. The personnel will be J. C. Daigle, store manager, and Curtis Stripling and Durwood Dick, floormen. This store comes under the direct supervision of J. B. Ellzey, district manager, headquarters at New Iberia, La.

New Service for Oil Operators

A new service of oil-field, refinery, and chemical-plant pipe bending is now offered to operators by Levingston Shipbuilding Co., Orange, Tex.

During the war years the company in-

stalled a modern equipped shop devoted entirely to pipe bending and pipe fabrication to expedite construction of naval vessels. This shop has now been converted to peacetime production and Levingston engineers are able to offer their experience and service to the many branches of the oil industry.

Kellex Corp. to Continue Expanded Peacetime Program

The Kellex Corp., organized during the war to develop the K-25 atom bomb project at Oak Ridge, Tenn., is being continued as a peacetime organization with an expanded program, announcement by H. R. Austin, president of the parent M. W. Kellogg Co., states. The new vice president of this company, subsidiary to the M. W. Kellogg Co., is A. L. Baker and W. H. Denne, Jr., is general manager. Both the new officials have been associated with the Kellex company since its formation.

A. L. BAKER

W. H. DENNE, JR.

Zimmerman Joins Engineering Firm

Announcement that Gordon B. Zimmerman has joined the firm of Bechtel Brothers McCone Co., as chief process engineer, is made by William E. Waste, president of the engineering and construction firm with principal offices in San Francisco and Los Angeles.

Campbell Heads Sales For Container Division

Andrew H. Campbell has been appointed general manager of sales for the Eastern Container Division of Rheem Manufacturing Co. it is announced by C. V. Coons, general sales manager. Associated with him as his assistant will be G. Wesley Gates, who has been in charge of the New England and New York territory for the container division.

Lovejoy Flexible Coupling Co. Takes Over Ideal Transmissions

Lovejoy Flexible Coupling Co., 5001-5009 W. Lake St., Chicago, has acquired in entirety, the manufacture and sales of the mechanical-power transmission department of Ideal Industries (formerly Ideal Commutator Dresser Co.), of Sycamore, Ill.

Hoeflich Joins Thermoid

Thermoid Rubber Division of Thermoid Co., Trenton, N. J., announces the appointment of Edward C. Hoeflich as industrial sales promotion manager. Hoeflich was formerly connected with Ace Manufacturing Co. of Philadelphia, as sales and advertising manager, and Henry Disston & Sons of Philadelphia as manager of steel specialties division.

Homco Announces New Store Points and Personnel Changes

Houston Oil Field Material Co., Inc., recently opened two new store points in Eunice, N. M., and Mamou, La., and complete stocks of supplies, including drilling muds and chemicals, are maintained. R. M. Freeman has been named as store manager at Eunice. Jack Stone has been transferred from Odessa, Tex., to Eunice, where he is employed as mud engineer. Myron Vogan, warehouseman, was transferred from Eunice to the Houston store.

W. C. Johnson, formerly store manager at Natchez, Miss., has been transferred to the new store at Mamou, as store manager. Johnson will be replaced in Natchez by K. R. Murphy, who has been promoted from salesman to store manager. C. S. Maxie, formerly warehouseman at Natchez, has been transferred to Mamou as salesman. B. W. Stephenson was formerly warehouseman at New Iberia, La., but has recently been transferred to the new store at Mamou.

W. G. Seis has been transferred from the Victoria store to the Kenedy, Tex., branch office as salesman. Joe B. Pogue, cutting and fishing-tool operator, was recently transferred from the Brookshaven, Miss., store to Houston.

Cooper-Bessemer Engineer Rejoins New York Staff

C. J. Havekotte has returned to the New York branch office of The Cooper-Bessemer Corp. as sales engineer, following an absence of 4 years in military service. Havekotte began his career with the company in the engineering department at its Mount Vernon, Ohio, headquarters in 1938 and was transferred to the sales department in 1939.

Lisle With A-1 in Oklahoma City

Newly appointed Oklahoma representative of the A-1 Bit & Tool Co., Houston, is J. C. Lisle. Formerly district manager in Louisiana, Lisle will maintain offices at 418 S.E. Twenty-ninth Street, Oklahoma City.

Amercoat Appoints Applicators For Mid-Continent Area

Green Contracting & Engineering Co., Inc., Wichita, formerly known as Oil Field Maintenance Co., has been appointed authorized applicators for all Amercoat plastic coatings in the Mid-Continent area.

Hewitt Sends Crane to Tulsa

Robert E. Crane has moved to Tulsa from Indianapolis to become the factory representative of Hewitt rubber division of Hewitt-Robins Corp., Buffalo. His headquarters will be at 413 South Kenosha. Crane has been with this company for the past 8 years.

Tulsa Nomads Hold Stag Dinner

The annual stag dinner of the Tulsa Nomads was held Friday evening, July 12, at the Tulsa home of Henry A. Bourne, president of the club. Approximately 75 members and guests were present. Georges Le Powles, of Regie Autonome des Petroles, Paris, France, was among the guests at the dinner.

Baker Joins Timken

Richard C. Baker, formerly manager of the Canton, Ohio, office of Ernst & Ernst, has become associated with The Timken Roller Bearing Co. as an executive assistant. He will supervise all tax problems and affairs, and will make special studies of accounting and related matters.

Girdler Opens Southwestern Office in Tulsa

The Gas Processes Division of The Girdler Corp. has announced the opening of a southwestern office at 601 Central Building, Tulsa. Southwestern representative is J. D. Gordon, formerly the division's eastern representative. Succeeding Gordon as eastern representative is D. Kenneth Finlayson, whose headquarters are at 150 Broadway, New York.

J. D. GORDON

D. K. FINLAYSON

Sherk Made Division Purchasing Agent

C. K. Sherk has been appointed purchasing agent of the merchandising divisionn of The National Supply Co. He succeeds John Kirby who will remain with the company in an advisory capacity for some time and then retire.

Blair Heads District Office

K. W. Davis, president of Mid-Continent Supply Co., announced that his company has opened a district office at 406 Patterson Building, Denver. Barney Blair is manager of this new district. Blair joined Mid-Continent Supply Co. in 1937 at Lisbon, La.

BARNEY BLAIR

Two Join Turco Technical Service Staff

Turco Products, Inc., Los Angeles, Chicago, and Houston, announces the recent affiliation of Donald Keating and Thomas G. Franzreb to the technical service division staff.

Thermoid Names Two

PAUL KELTING

Jack Owen, Manager, oil-field products division of Thermoid Co., Trenton, N. J., announces the appointment of Paul Kelting as field manager and Earl Johnson as oil-field product sales representative in Oklahoma. Kelting came to Thermoid in January 1945 as district manager of the Houston branch. Johnson comes to Thermoid from Green Head Bit & Tool Co. He is headquartering at Oklahoma City.

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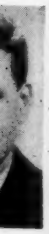

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